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## WAR ACTIVITIES IN MEDICINE AND SURGERY

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*Colonel C.A.M.C., C.E.F.*

**T**WELVE years have passed since the Academy of Medicine was brought into existence by an act of incorporation amalgamating the various medical societies which existed in Toronto, as individual institutions, in 1907. The objects of the Academy, as set forth in the Declaration of Incorporation were "the advancement of the art and science of medicine with its collateral branches; the promotion and maintenance of an efficient library and museum; professional improvement; the cultivation of harmony and good feeling among its fellows; and the promotion of the corporate influence of the profession in relation to the community". We may confidently assert that the objects aimed at have been attained, in some respects with greater success than we had anticipated. I appreciate the honour which has been conferred upon me in electing me to the President's chair, and in thanking you I can only say that my aim will be to justify to the best of my ability the confidence you have thus placed in me.

The Academy of Medicine constitutes to-day an essential and vital force in the medical fraternity of our city and neighbourhood. We should endeavour to foster good feeling and confidence among our colleagues in the profession and by the progressive character of our efforts to cater to the needs of medical men, we should make ourselves indispensable so that, as a matter of course,

every practitioner of good standing in the community will seek to enrol his name on the list of fellows. Our aims must be laid on broad lines; we should enlist the aid of workers in the allied sciences and utilize in particular laboratory investigations in their application to medicine. We are fortunate in being in close touch with the Provincial University and we are able to utilize to the full the advantages which accrue therefrom.

No institution existing in this country can fail to be affected by the far reaching influences of the war. It affects the Academy of Medicine in a variety of ways. Of our membership of five hundred and five, there have been one hundred and thirty-two on active service, of whom one hundred and eight have served overseas. Of those who have seen service overseas, there have been three killed in action or died while on service. There have been a number wounded. Some of our members were at the Front in France in the autumn of 1914 and some of these are still overseas, having been on continuous service abroad ever since.

Practically all the officers of the staff of the University Base Hospital at Salonica were members of this Academy. Others have served at the Dardanelles, in Mesopotamia and in Egypt. Some have done duty as medical officers on transports, and others in His Majesty's Navy.

The men who have had the good fortune to have seen service at the Front have been profoundly influenced by their experiences. On their return home they cannot fail to make that influence felt in turn in the Academy. Let us enquire for one moment in particular as to the effect produced in an institution like this by the returned soldier, instead of merely dealing in generalities such as are often indulged in, sometimes in ardent anticipation, often as a threat, when contemplating the influence which such men will wield in the political sphere and in the various activities of the life of the community as a whole.

We may assert the fact, universally recognized, that the experiences of this war have had revolutionary effects upon the practice of medicine and surgery. Many of our members have done pioneer work in the gradual evolution of efficient methods for the treatment of the wounded and sick as well as in the prevention of disease among our troops. It would be invidious to mention names, and if we did so we would be apt to do injustice to the work of many whose particular contribution to the medical service of the army is as yet not fully known to us. We can state, however, that many of our members have had no small share in the intro-



duction of methods at the Front which have been not only of immense service in maintaining efficiency and in preserving the health of our troops during the war but which will have an effect, such as we may truly describe as revolutionary, in the future practice of medicine and surgery in peace time.

In the prevention of disease our sanitary officers have done their full share. They have played their part with marked efficiency by utilizing methods at the Front which have made the experiences of this war, in the incidence of disease, different from all former campaigns. It may be confidently asserted that this war would long ere this have been prematurely terminated, as has been the case in previous wars, by infectious diseases and the ideals for which we are fighting would have thus been sacrificed, had we not learned and practised effective means for the control and prevention of disease.

Those who have seen service in the East have had the opportunity of studying tropical diseases: dysentery, malaria, relapsing fever, para-typhoid and other more rare affections. These have been carefully studied in the laboratory and in the wards. As a surgeon I am perhaps more impressed with the revolutionary effects, or should I rather call it evolutionary effects of the experiences of this war upon surgery. Many of our pet theories regarding the ætiology and the prevention of infection in wounds have gone by the board. So, too, we have abandoned many of the methods of treatment which we considered formerly as essential to success. Perhaps the greatest benefit conferred on surgery is the atmosphere of scepticism which has been developed. In our arduous and concentrated efforts to discover Truth we realize, as never before, that we have arrived at no finality. The surgeon to-day, if he is to reap the full benefit of the experiences of the war, must have an open mind; he must be able to adapt himself to entirely new ideas regarding the healing of wounds; the resistance of serous surfaces; such as the large joints to infection; the possibilities of extensive operations on such organs as the lung and the great blood vessels, the methods of repair of the skull, when large portions have been destroyed; methods of dealing with wounds of the cranial contents; the marvellously ingenious methods of repairing those distressing and disfiguring wounds of the face and jaws and a host of other things which have advanced the practice of surgery in four years at a colossal rate. My contention is that the surgeon to-day has an entirely different view-point from what he had before the war. He is compelled to be more scientific and less empirical in his

methods. He must be progressive. The experiences of the present war will have their effect upon the practice of surgery for all time to come, in civil as well as in military practice.

During the past year there has appeared in the press an important contribution to the history of medical science in the "Life of Lord Lister", by Sir Rickman Godlee. The very wide appreciation of this book has made it necessary to issue a second edition, within a year of its first publication. What has always impressed one with the life and work of Lister, perhaps more than anything else, is the progressive spirit which he so splendidly displayed. In the establishment of scientific facts and their application to the practice of surgery he reached no final goal, but many times expressed his belief that the methods he introduced would be improved upon in the future. With prophetic insight he referred to the possibility of employing a technique which has in recent years been elaborated and termed "aseptic surgery". He shared the spirit of John Hunter who remarked to a pupil on one occasion: "Do not write down that observation—I shall probably change my mind next year." Unfortunately the pupils of a great teacher—and all surgeons are pupils of Lister—are apt to be satisfied with the conclusions arrived at by the Master. We should learn from Lister to be progressive and attempt to build on the scientific foundation he so splendidly laid when he enunciated the principles of antiseptic surgery, adding a superstructure which will continue to be an ever increasing monument to his genius and fame. It is a truism to state that the remarkable advances in surgery during the present war would have been impossible if Lister had not lived and worked.

We may give some specific illustrations of the advances made in surgery. The incidence of tetanus in this war has proved the value of the experience we have gained in the treatment of the wounded in the present campaign. A study was made of the number of cases which occurred in home hospitals among the wounded returned from France. In October, 1914, there were thirty-two cases per thousand wounded. In November, 1914, there were two cases per thousand and during the subsequent two years the average number per month only reached one per thousand wounded. There were several factors which produced a very large number of cases of tetanus in September and October, 1914, such as the character of the soil in the fighting area; the heavy fighting with its heavy toll of wounded; the difficulty of properly caring for the wounded, etc.; but it was not until the middle of

October that prophylactic inoculation was introduced in anything like a complete scale. Immediately a remarkable fall in the incidence of tetanus occurred, the number occurring being less than one thirtieth of those prior to the employment of prophylactic treatment. But experience has led us to further conclusions, and we find that antitetanic serum is curative as well as preventive in its value.

Large doses of the antitoxic serum are given by the intrathecal route immediately on tetanus manifesting itself. From 50,000 to 100,000 units may be given in the first few days, the object being to saturate the body with antitoxin as quickly as possible. The curative value of such treatment has been determined in many instances. Then again we have learned that the bacillus of tetanus may remain encapsuled within the tissues for prolonged periods and may, independently of any fresh traumatism, cause a recurrent attack. This is very prone to occur as the result of any secondary surgical operation and in certain specific instances has brought about fatal results.

Our knowledge of gas gangrene, its ætiology, prevention, and treatment has been greatly advanced. Its spread along lymph spaces and the invasion of damaged muscle fibrils; the absence or scanty occurrence of leucocytosis; the proliferation of endothelium with thrombosis of veins resulting in rupture of vessels with extravasation of blood and rapid spread of infection; the characteristic appearance of certain cases in x-ray plates, are some features of this infective process regarding which our knowledge has been greatly increased.

The treatment consists first in prophylaxis; encouraging personal cleanliness in the soldiers, treating trench walls with slaked lime, etc. Every wound should be looked upon with suspicion and should be submitted to immediate and thorough cleansing, the use of antiseptics and the removal of all foreign matter. Particular attention is paid to the removal of all lacerated muscle tissue, and all fragments of bone and the securing of complete hæmostasis. If gas gangrene supervenes, the entire wound is freely opened up in all its ramifications, all dirt and foreign matter is sought for and carefully removed. Hæmotomata which may lodge infection are eradicated, all contaminated muscle tissue is widely excised and hæmorrhagic oozing carefully checked. Free incisions are made in the long axis of the limb, all tension is relieved and the wound is left freely open avoiding all pressure and possible constriction of blood vessels, free drainage is provided and the

wound irrigated with a potent antiseptic. If amputation is considered necessary the flaps are left widely open without suture.

The results obtained by such treatment may be illustrated by those published by Ivens. Of four hundred and sixty-four cases of gas infection, forty-two were fatal, twenty-five died from gangrene, four died from tetanus, and the rest from severe injuries which they had sustained. When the gangrene was limited to a group of muscles it was possible in forty-one cases to do a local excision: of these thirty-three recovered. Amputation by the open method and with lateral skin incisions was practised sixty-five times; forty-eight of these recovered.

One other noted example may be mentioned of advances made in this campaign; for the first time in war the transfusion of whole blood has been employed. It is of special interest to record the fact that Canadians were the first to employ this life saving measure at the front. No treatment has been more spectacular or effective in cases of hæmorrhage.

The War Museum which is to be established at Ottawa is an undertaking of great national importance. Already, on an extensive scale, arrangements have been made to assemble a collection of the various implements of war. We understand the French Government, for example, has undertaken to make large contributions to the museum, which will consist of war materials of all sorts illustrating the varied activities both at home stations and in the field. The museum will be suitably housed in buildings which are to be constructed for the purpose. The section devoted to the medical aspects of the war will contain an exhibit of great importance. It will constitute a permanent record in Canada of the part played by the Canadian Army Medical Corps. This collection will be of great educational value. From it materials may be obtained from time to time by teaching institutions and by such bodies as this Academy when they are required for purposes of illustration and instruction. We are familiar with some of the work which has been done in connection with this project by our Canadian hospitals in England. At our solicitation, money was provided by the Dominion Government and at Orpington we secured the services of a group of experts consisting of an excellent sculptor, who reproduced very beautiful models in wax illustrating the various stages of such wounds as those of the face and jaws, from the condition at the time the wound was inflicted up to the final processes of repair. Similarly, wounds and injuries of other parts of the body are reproduced in wax. Then we have an expert who



makes plaster casts, another who is an artist in making coloured pictures in pastels, yet another who specializes in coloured photography, transparencies, and in the production of cinematograph films. Care is taken in the x-ray department to preserve and convert into lantern slides the large amount of valuable material which is collected there. Arrangements have been made that this group of experts should travel about among our various hospital units to reproduce and preserve for our museum everything of value in our hospital service.

Material accumulated so rapidly that we had to provide a suitable place for storage until such time as it could be transferred to Canada. Through the courtesy of Professor Arthur Keith, the curator of the Royal College of Surgeons' Museum in London, a large room was provided which in peace time had contained part of the valuable Hunterian collection, but which had been transferred to safe quarters because of the danger from air raids. Most of these specimens were preserved in spirit and would therefore be destroyed by fire. In this room is now a large collection forming the Canadian exhibit which is extremely creditable and has attracted much attention from the numerous visitors to the museum. Professor Keith has himself grouped the specimens in a most effective manner and has had them labelled and described each with a suitable inscription.

I would urge that this Academy do its full share of duty in using all its resources to disseminate among the profession the lessons learned from the war both in medicine, in surgery, and the allied sciences. The influence of the experiences of war on our professional work is evidenced by the enormous amount of space devoted to these problems in current medical literature. Our various societies, national or special, when they meet, devote a large portion of their time to war subjects. Our Academy must play its full part in this regard. Already many of our members have returned after extensive experiences at the Front. We hope to have some valuable contributions from them during the ensuing session. Primarily the most pressing problem for solution existed at the Front, but as the sick and wounded gradually sifted through to the base and were finally transferred to their home land, we began to find that the medical and surgical treatment of the returned soldier required and demanded special concentrated study. Eventually, of course, when peace arrives, there will still remain problems in the treatment of our men at home which will demand our best efforts for many years to come. Many mistakes have

been made in the past because of improperly constituted authority in the home field, but the situation is vastly improved. It has been conceded that military and not civil organizations must run our hospitals for the returned soldier. The Canadian Army Medical Service possesses the necessary organization for the purpose. The men who crowd our hospitals in Canada, and who will continue to arrive here in increasing numbers as time goes on, have been trained for years to submit to military discipline. It is essential for their personal welfare that they should continue under military discipline until such time as they are fit to return to their normal vocations of peace time. I fancy no one will venture to gainsay the truth of the assertion that officers and men alike have vastly benefitted by the discipline to which they have been required to submit while serving their country in the army. In some quarters the tendency is, on behalf of well meaning individuals, to relax all discipline and to encourage license. If we attempt to argue this matter out logically we must first agree that these well meaning individuals have, in common with all loyal citizens of our country, the desire to do all in their power to benefit the returned soldier and to demonstrate in some practical manner the debt they owe to men who have sacrificed so much and who have suffered so greatly in the splendid service they have rendered to their country. These men have bravely faced the terrible experiences of the battle-front; the horrors of war, rendered more terrible than ever before through the diabolical methods adopted by a brutal and barbaric foe. Many of our fellow citizens have sacrificed their lives. A very large number have been wounded. There is a large army of men who have lost one or more limbs and in other ways have been maimed for life. We are all at one in our conviction that we cannot do enough for these men when they return home. Our desire is to restore them to their home and family and to secure for them comfort, prosperity, and contentment. Our contention is that the only way to accomplish this is to make them useful citizens. Many of our men have spent long periods of time in hospital. It is a common expression to hear regarding them that they have "got the hospital habit". They become accustomed to having everything done for them, they lose all ambition and have no desire to help themselves. If they are to become useful citizens they must be taught to take a different view point. Every effort must be made to restore ambition, to make them less dependent upon others, and to foster a desire to get back to some useful employment. In so far as we succeed in that regard we not only do the

best possible service to the individual but we also benefit the state. The economic value of efficient treatment is not to be overlooked. The state is saved much in the payment of pensions and gratuities, and the individual's earning power is increased. The methods used to accomplish these results have been gradually evolved; special hospitals for limbless men have been established where they are trained to do work in spite of great disability. We have special institutions for the re-education of men who have suffered various functional losses of brain, nerve or muscle. Individuals suffering from shell shock are placed under the care of specialists who by these remedial measures are accomplishing excellent results. There are many other activities organized for the purpose of restoring these disabled victims of the war to conditions approaching as nearly as possible the normal.

Vocational training has received very careful consideration and is being placed upon a thoroughly systematic basis. The object is to discover, by careful study, the work for which the individual soldier is best fitted. Investigations are carried on at a very early stage in the care of the wounded man and, whenever possible, his vocational training begins while he is still in the hospital ward.

Experiences of the war have given a tremendous impetus to the development of the method of treatment described as Physiotherapy. This utilizes many different forms of physical energy in the cure of the patient. Heat, light, electricity, baths, massage, gymnastics, the x-ray, radium, etc., are now employed by experts in each department with skill and judgement. The value of the results obtained in the treatment of the wounded soldier by such means are so apparent that all modern hospitals, civil and military, if they are to maintain their reputation for efficiency will be compelled to make provision for physio-therapy in all its branches and to secure skilled administrators.

In order that these various activities may effect their purpose we must have efficient organization and the means of exacting thorough discipline. Our Canadian Army Medical Service possesses the necessary organization. We are fortunate in having at the head of it in Canada a man who has the ability and the determination to utilize that organization and to direct its policy in a manner which will ensure the maximum of effectiveness in its administration.

This Academy and similar organizations throughout the country have their duty to perform in supporting the multitudinous efforts

which are being made to care for the sick and wounded men who return to Canada. It will be our policy to give our loyal support to the Canadian Army Medical Corps and to aid them in every possible manner in the important and responsible work they are accomplishing in this country. I hope we shall be able to show some special interest in the hospital organizations which are established in our city and neighbourhood. Discussions will be of value in connection with the work done in such clinics as the Military Orthopædic Hospital, the clinic for special cases at the Toronto General Hospital, the neurological clinic, the clinic for chest cases, etc. These all have not only their special bearing in military medicine and surgery, but have also a much wider application, and here as elsewhere the experiences of this war will produce a profound effect upon the theories and practices of our profession.

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THE College of Physicians of Philadelphia announces that the next award of the Alvarenga Prize, being the income for one year of the bequest of the late Senor Alvarenga, and amounting to about two hundred and fifty dollars, will be made on July 14th, 1919, provided that an essay deemed by the Committee of Award to be worthy of the prize, shall have been offered.

Essays intended for competition may be upon any subject in Medicine, but cannot have been published. They must be typewritten, and if written in a language other than English should be accompanied by an English translation, and must be received by the Secretary of the College, Dr. Francis R. Packard, 19 South 22nd Street, Philadelphia, Pa., U.S.A., on or before May 1st, 1919.

Each essay must be sent without signature, but must be plainly marked with a motto and be accompanied by a sealed envelope having on its outside the motto of the paper and within the name and address of the author.

It is a condition of competition that the successful essay, or a copy of it, shall remain in possession of the College; other essays will be returned upon application within three months after the award.



## LIQUID-TIGHT CLOSURE AND THE TREATMENT OF INFECTED WOUNDS

BY W. H. TAYLOR, M.D., C.M.

*late Capt. Canadian Army Medical Corps*

AND

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IT was over two years ago that work was commenced with a view to provide a liquid-tight closure for septic wounds. Since that time we have experienced many difficulties and disappointments in our attempts to devise a method of irrigation which, by fluid pressure, would enable a wound to be inundated to its remote crevices and yet avoid leakage into the bed. Some forty odd models were tried and rejected before the present form of the appliance was arrived at. Every change in construction of the rubber model required the manufacture of an entirely new steel die from which the former were moulded. A single die, on account of unavoidable difficulties of war-time manufacture, took sometimes several weeks to complete; it was the delay in obtaining these which has handicapped us so greatly in perfecting the apparatus.

### MECHANICS OF THE APPLIANCE

The appliance, which is of soft rubber, is virtually a water-trap. Its water-tight principle does not depend upon suction but upon the positive pressure of its contained fluid. No adhesive or other substance is required; its water-tightness is inherent in its construction, the moderate pressure of a bandage alone being necessary to hold it in position against the skin.

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Read by N. B. T. before the Shorncliffe Medical Society, August 26th, 1918. Previous papers under this heading published in the *Lancet*, September 22nd, 1917, and May 11th, 1918, also in the *C.A.M.C. Bulletin*, April, 1918.

Figure 1 shows a cross section of the device prior to its application. Figure 2 shows a cross section of the device applied to a wound and held in position by a bandage.

The flange *A* is the chief factor responsible for the maintenance of a water-tight joint between the rubber and the skin. This flange, when the appliance is filled, is kept in contact with the skin by the hydrostatic pressure in the main chamber *MC*.

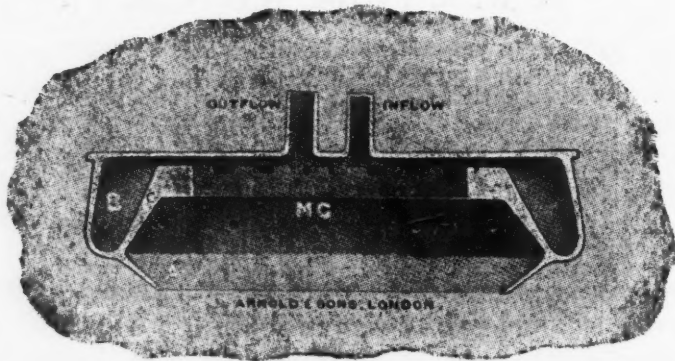


FIG. 1

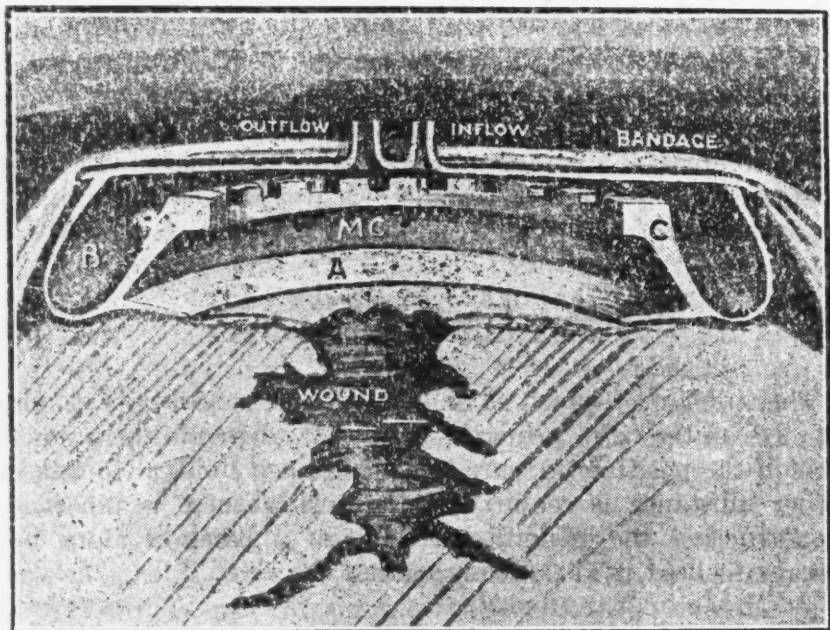


FIG. 2

Fluid passes from the main chamber *MC* to the outer chamber *B* by means of the corrugations on the top and the perforations through the substance of the slanting wall *C*. In this way the pressure on the two sides of *C* is equalized and this wall is thereby prevented from being rotated outwards by the pressure in *MC*. As the chamber *B* fills with fluid, it distends and becomes wedged between the bandage and the skin and is prevented from rising therefrom. Furthermore, the floor of this chamber is attached at its inner part to the wall *C* at the point where the latter gives off the flange *A*, consequently when *B* becomes distended by fluid and is prevented from rising by the restraining bandage, it draws the wall *C* downwards and brings the flange *A* into a horizontal position—that is, parallel to the skin surface.

The pressure of fluid in the main chamber *MC*, acting perpendicularly upon the flange *A* keeps it in intimate contact with the skin. It is evident then, that leakage is impossible so long as the outer chamber *B* is held in contact with the skin by means of the bandage.

By virtue of such a water tight dressing one is enabled alternately to fill and evacuate a deep wound; to fill it even to its remote recesses with irrigating fluid under positive pressure and to empty it again under negative pressure. These alternating pressures set up an ebb and flow current within the cavity of the wound and its ramifications, with the result that, with each cycle, the consistency of the pus becomes rapidly reduced. A greater and greater dilution of pus is effected at each flushing of the wound—a dilution progressing geometrically—until finally the effluent grows clear and the lining granulations clean. We have found that thirty-six hours is the average time required to cleanse a wound of pus. Upon removal of the appliance at the end of this period, clear fluid alone can be expressed from the wound and its sidetracks; not of course that the suppurative processes have been brought to a standstill, but merely that pus is carried away as quickly as it is formed; that the solution is being brought into contact with the granulations lining the walls of the wound cavity and its diverticula, and that those bacteria, not embedded in the tissues, are being rendered inert through dilution.

#### THE APPLICATION AND USE OF THE APPARATUS

The apparatus is applied to the part, with its centre corresponding roughly with the deepest part of the wound, and bandaged in position. The bandage should be snug and evenly applied but

not tight. The long diameter of the appliance should be placed in the long axis of the part with its curve coinciding with the contour of the skin.

The following auxiliary apparatus will be required to install the irrigation:

A reservoir capable of containing two to three pints of fluid—an ordinary douche can will serve.

A waste pail.

A pair of glass unions.

Two three-foot lengths of rubber tubing, each fitted with a pinch cock.

The reservoir is connected, by means of one length of tubing, and a glass union, to the smaller tube issuing from the cover of the appliance; the larger tube issuing from the cover is similarly connected to the second length of tubing, which is led into the waste pail (Fig. 3).

We depend upon fluid pressure to conduct the irrigating solution into the interior of the wound. No drainage tubes are used; our experience has been that these obstruct the outflow of pus as often as they drain. Even provided that the main cavity of a wound is efficiently drained thereby, side pockets are frequently blocked by the wall of a rubber tube and thorough cleansing of the granulating surfaces with which it comes into contact, prevented. We have on many occasions seen a tube, or several small ones placed close together, acting as a very efficient cork and preventing drainage from the surface opening itself. The insertion of a tube is usually haphazard, and unavoidably so; one is unable to learn the relative position of its deeper portions. It may be tucked away in a secondary pocket, it may be kinked or pressed against the bottom or side wall of the primary cavity, which may represent no more than the lobby in the general architecture of the wound. In such cases the area tributary to it must be limited. Later, it may become plugged with thickened pus or a fragment of necrotic tissue, in which event its usefulness as a drain is at an end.

In some cases of old sinuses with small outlets, showing a tendency to valve, we use a small wire cage to keep the mouth of the wound patent (Fig. 4). It is usually better, however, to enlarge the opening by incision and to use nothing whatever in the wound. No attempt should be made to drain a deep pocket through a very small surface opening; though the large and often mutilating incisions, one sometimes sees, are by no means necessary, a moderate sized outlet should be provided for the pus, especially if this be viscid and mixed with gross necrotic tissue.



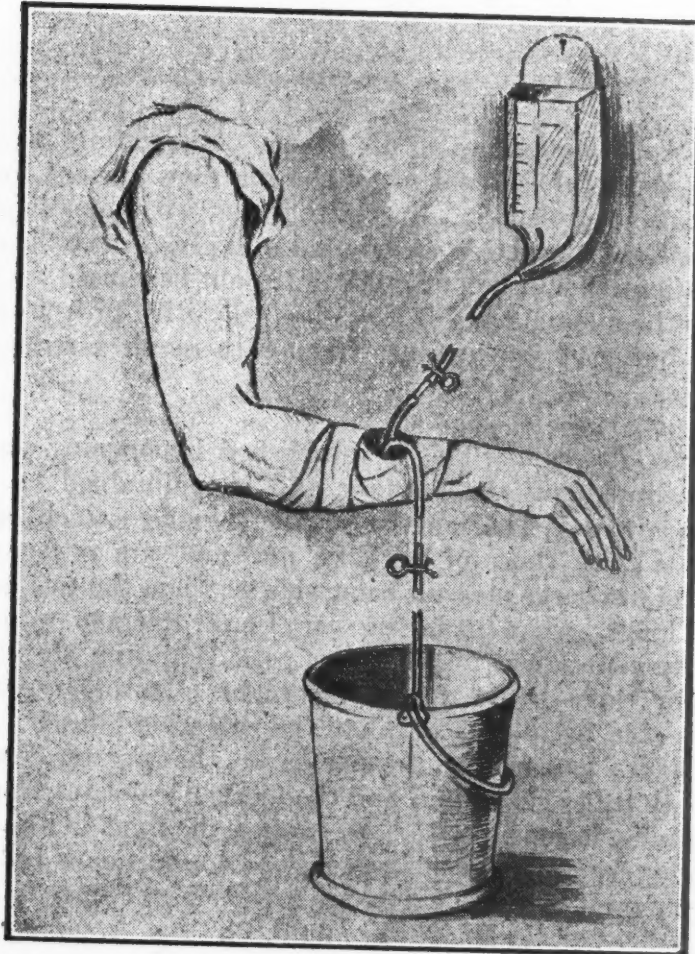


FIG. 3

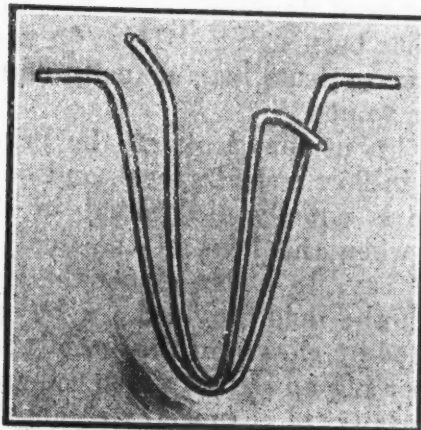


FIG. 4

## REGULATION OF THE IRRIGATION

The essential feature of this form of irrigation, as already stated, is the establishment of an ebb and flow current by means of alternating pressures. In gauging the amount of pressure, either positive or negative, to be used in a given case, the comfort of the patient should be our guide. If pain be caused we may be sure that the amount used is excessive. Positive pressure rarely is at fault, but negative pressure frequently requires reduction on this account.

*Positive Pressure.*—This is established by opening the inflow tube and clipping off the outflow; and is maintained so long as these are left so. The lengths of the periods—which of course interchange with those of negative pressure—are relative to the quantity of discharge present, being shorter when the pus is abundant and longer when it is scanty. In an average wound plus pressure is maintained for one hour periods during the day, and for two or three hours during the night. During the day the patient is able, usually, to regulate the irrigation himself. During sleeping hours, as a matter of convenience, the pressure may be reduced, both tubes clipped off and the appliance not interfered with until morning, except, perhaps, to freshen the fluid in the wound. In this way the appliance acts merely as a continuous bath.

The amount of positive pressure used is from twelve to eighteen inches; *i.e.* the level of the fluid in the reservoir should be as far as that above the level of the wound. In cases of empyema positive pressure should be not more than six inches, and its periods should be of brief duration.

The question has been asked, "How do you know that the fluid, during positive pressure, *does* actually find its way into the remote recesses of a wound?"

In answering, let us first look at the principles of physics involved. A fluid in flow seeks its level, and once having become static, its pressure is equally distributed in all directions. It follows then that when the level of the fluid in the supplying reservoir is, let us say, 18 inches above the level of the wound, with free ingress of the fluid provided for by opening the inflow and escape prevented by closure of the outflow tube, the surface of the wound is supporting an eighteen-inch column of fluid. As we have a continuous system of channels extending from the supplying

reservoir to the termination of the most distant recess of the wound cavity, the fluid will continue to flow until the wound and all its off-shoots are inundated, when the flow will cease and the pressure become equalized throughout all parts of the system. It seems evident that any part of a wound permeable to fluid would be reached by the irrigating solution. In other words, any pocket from which pus can be discharged can, *ipso facto*, be penetrated by this form of irrigation.

This may be readily shown clinically. After thirty-six hours, as already stated, no pus can be expressed from a deep wound. Pressure along tracks which previously had discharged quantities of pus, brings forth, at the end of this time, clear or only slightly turbid solution. Again, in several cases of through and through wounds, the two openings had persisted but the intervening tunnel had apparently closed; no evidence of an inter-communication could be obtained by probing or syringing, or in some cases by the injection of a bismuth mixture followed by a radiograph. In all such cases when the device was applied to one of the openings, clear fluid would after a time—though not, perhaps, for twelve to twenty-four hours—issue from the other.

Even more graphic evidence is afforded by the *x*-rays. Here is a series of pictures taken of a gun-shot wound of the thigh, with fracture. Two of these were taken prior to the application of the apparatus, whilst two were taken after a 25 per cent. solution of potassium iodide had been used as the irrigating solution. This solution casts a shadow whereby the extent of penetration of the fluid can be readily demonstrated. In these pictures the path of the fluid may be traced down to and along the shaft of the femur. The irrigation in this instance was commenced two hours in advance of the taking of the radiograph, positive pressure having been maintained for the entire period. The wound's mouth was less than one inch in diameter, and a probe passed inwards for a depth of one and one-quarter inches.

Let it not be supposed that there is anything violent about this fluid pressure. It is rather in the nature of a gentle but very insistent seepage which occurs—the fluid probably taking several hours to permeate all depths of a wound. In upward of one hundred and twenty cases, treated at Granville, Orpington, and elsewhere, no ill effects have at any time occurred. The idea of the pus being placed under pressure and forced ahead of the irrigating fluid along paths which, ordinarily, it has no ten-

dency to follow, is not correct. It is to be remembered, in this connection, that the mass effect of the fluid during positive pressure is quite distinct from any action resulting from the movements of its integral particles. Thin pus and the irrigating fluid are freely miscible, and diffusion and convection currents, regardless of hydrostatic pressure, allow, or rather provide for, a ready movement of discharges toward the outlet of the wound and so into the cavity of the appliance. Furthermore the low density of the pus as compared with that of the irrigating fluid (5 to 10 per cent. saline) enables the former, even though this be thick, to make its way upward and be replaced by the heavier solution. These forces, whose effects are augmented by the reversal of current consequent upon the establishment of negative pressure, induce an intimate intermingling of pus and the irrigating fluid until the contents of the wound and the appliance reach a more or less uniform consistency. The appliances themselves are capable each of accommodating from 8 to 20 ounces of fluid, according to the size. As it is an exceptionally dirty wound which contains more than four drachms of pus at any given time, the discharge will be diluted anywhere from sixteen to forty times or more at each filling of the apparatus. At the end of the seventh cycle there will be a dilution of one in several millions. In any event it would be feasible to use very small amounts of positive pressure until the contained fluid became clear.

If the validity of these data be accepted, it must be agreed that by such a dilution of pus, with its content of ferments and bacteria, the spread of infection would be impeded rather than encouraged. This conclusion is amply confirmed clinically; a wound cavity becomes shallow and contracts rapidly under treatment, even though positive pressure be used for the greater part of the time.

*Negative Pressure.* This is established by closing the inflow and opening the outflow tube. The exhaustion of air, consequent upon emptying the appliance, produces a partial vacuum whose degree is directly proportionate to the length of the pendant column of fluid in the outflow tube.

Negative pressure acts very powerfully upon a wound, and in acute cases will cause pain if much be used. Pain even in slight degree should be avoided, and the negative pressure reduced or abolished if discomfort should be caused thereby. Chronic cases can usually stand the full quantum of suction, that is, the pressure represented by the height of the ordinary military bed above the floor level.



In order to measure and accurately regulate the amount of negative pressure, we use a small glass tube which gives off laterally a long curved limb (Fig. 5). Either end of the straight portion of the glass is connected to a section of the outflow tube; the extremity of the curved limb is free and is closed save for a minute pin-hole opening. By dividing the outflow tube at the

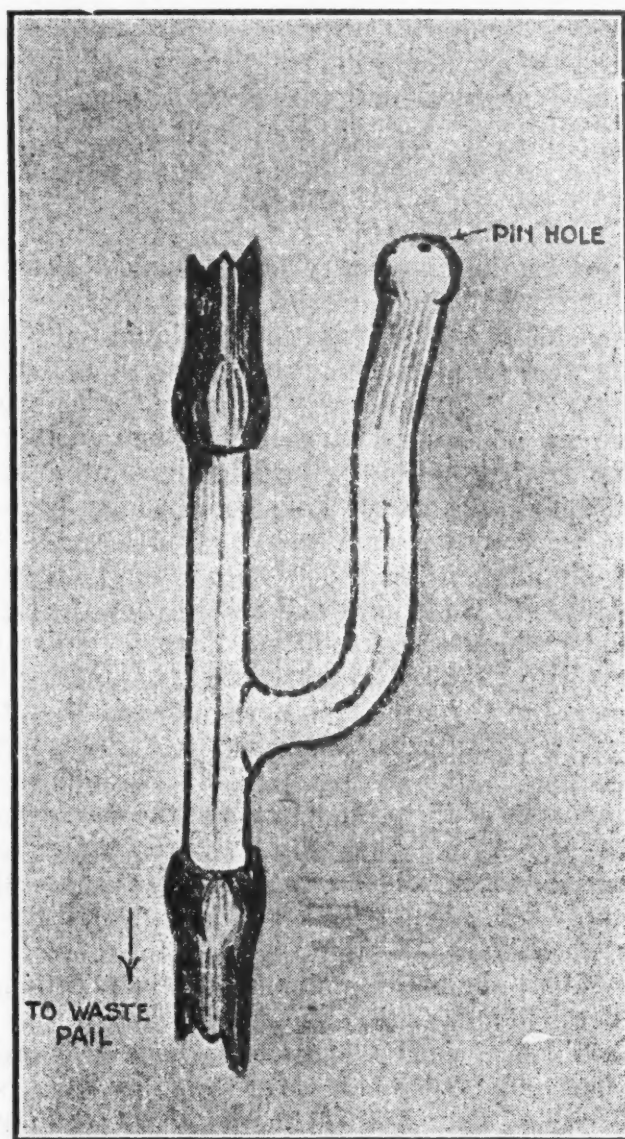


FIG. 5

desired level, this glass connection can be introduced into any part of the former's course between the wound and the floor; air is, in this way, admitted to any level of the outflow tube through the pin-hole at the extremity of the curved glass limb. The pendant column of fluid is broken at the point of entrance of air with the result that its length is reduced and the negative pressure accordingly diminished.

The periods of negative pressure are rarely of longer duration than fifteen or twenty minutes, except in cases of empyema, when it is maintained for the greater part of the time.

#### RATIONALE

Our belief in the superiority of mechanical cleansing to all other methods of sterilizing a wound has been the incentive urging us to devise some means of irrigation by liquid-tight closure.

Granting that an antiseptic, in the strength used, has power to sterilize or to reduce the infectivity of pus in the main cavity of a wound, there are yet many deep pockets, where microbes lurk and multiply, that are inaccessible to the solution as ordinarily employed, and the combined area of these pockets may be many times greater than that of the main cavity. Furthermore, the buried strata of the granulations, and the tissues beyond, are uninfluenced by such a solution. Here, as is well known from the experience of the "flare up" which so frequently follows an operation in the region of a recently healed wound, virulent organisms lie hidden. The experiments of Colonel C. J. Bond indicate that the rôle of the phagocyte is not always beneficent; it is also a factor in the spread of infection. After the ingestion of bacteria these wandering cells in many instances carry the latter into the deeper structures—fibrous tissue, muscle and bone—by a return immigration. Here they discharge their load, which is taken up by the fixed tissue cells. In this manner a secondary infective zone is created for a varying radius about the wound.

As antiseptics, apparently, are not selectively lethal to micro-organisms, it would appear that these, even though they penetrate to a sufficient depth, must destroy the tissue cells ere they can attack the harboured microbes. On the other hand our clinical experience has more than justified the hope we entertained that these harboured microbes might be reached by mechanical means. Variation in pressure of the irrigating fluid,—associated as it is by

gentle "milking," not only of the wound spaces, but of the tissue spaces as well, and accompanied as the latter presumably is by an outward flow of lymph loaded with microbes,—exerts its influence farther afield than the virtue inherent in any chemical substance could be expected to do.

The so-called antiseptic treatment of infected wounds is, in reality a combination of, or a compromise between, an antiseptic and a mechanical method. Even one most favourably disposed toward the treatment of wounds by antiseptic medication would not dream of dispensing with the mechanical factor. He would not think, for instance, of injecting an antiseptic into an unopened abscess with intent to sterilize it, nor hope to heal a wound in the presence of a foreign body—yet, if truly efficient, we should expect an antiseptic to do these things. Rather, he would provide free and dependent drainage; he would remove the foreign body; he would flush out with his antiseptic solution, removing as much pus as possible by the force of the stream; finally he would apply moist dressings to aid the removal of pus by capillary attraction. He would employ every means in his power to encourage the removal of discharge; did he not, the use of any antiseptic would be fatuous. Gross cleansing agencies in the treatment of the wound cannot, with impunity, be neglected; yet perhaps antiseptics may be dispensed with when full recognition is given to mechanical methods of cleansing.

The rationale of liquid-tight closure is but following this indispensable value of mechanical cleansing to its logical conclusion. "Where there is pus let it out" has been the dictum of ages; ebb and flow irrigation goes a step farther and insists "Where there is pus, wash it out and keep it washed out".

Though this method is primarily a means of exploiting the mechanical factors to the utmost, any solution, antiseptic or otherwise, may be used. Personally, we prefer 5 to 10 per cent. saline, and use this almost exclusively. Hypertonic saline, in that it produces a flow of lymph, does not waterlog the tissues and is incapable of combining with organic material, seems most suited to our purpose. It is also cheap and readily procured—facts not unimportant in view of the large quantities of fluid used in this method. Another consideration which has inclined us to prefer saline to an unstable antiseptic solution such as Dakin's, is the use of heat as a curative agent. The necessity of using the latter solution cold is not a disability when the amount of fluid used is unavoidably so small that it is not possible, in any case, to have it reach the

wound at the optimum degree of temperature. With liquid-tight closure, on the other hand, the volume of fluid employed may be sufficient to maintain the temperature, and to make possible the exhibition of an appreciable degree of heat within the wound.

### RESULTS

In order to combat wound infections successfully and with dispatch, the desiderata, in our eyes, appear to be: thoroughly to remove pus, the pabulum upon which organisms flourish; to render bacteria innocuous through dilution; to cleanse of microbes and effete leucocytes the subjacent layers of the lining granulations, as well as the deeper structures outlying the actual walls of the wound cavity, by the promotion of an outward flow of lymph; and last, to stimulate the local blood flow.

How are these requirements satisfied by the liquid-tight closure method?

The question of the removal of pus and bacteria from the wound cavity and its ramifications has been already dealt with; that this basic factor is fulfilled we are convinced. We will pass on to consider the question relating to the production of a lymph flow. That suction, even in moderate amount, is capable, when applied to a raw area, of promoting an outward flow of lymph is well known. Our results show that the negative pressure induced by this appliance has a marked lymphagogue action.

Should the apparatus be removed some little time after the treatment has been instituted, when the wound is fairly clear of pus, a large quantity of clear lymph will be found within the cavity of the appliance and upon the surface of the wound. Similarly, the fluid in the waste pail, though practically clear, shows, when treated with nitric acid, a large proportion of albumen. A proportion of this lymph flow must of course be ascribed to the osmotic power of the saline itself, yet its volume is much greater than this will account for, and exceeds that which saline used in the ordinary way will promote. Furthermore, when negative pressure is not employed, we do not see anything approaching the same degree of lymphorrhœa.

In this subject of lymph flow is bound up the question of sterilizing the underlying tissues. The suggestion that the lymph carries with it a burden of bacteria and dead phagocytes seems plausible. It may also retard return immigration. Though no



incontrovertible data has yet been obtained, such as might be afforded by cultures, or the microscopical examination of sections from the deeper tissues before and after treatment, to prove that this form of irrigation is capable of effecting a thorough cleansing of the outlying structures, there is, nevertheless, a great deal of *prima facie* evidence indicating that such is the case. For instance, during the first few hours of the treatment, the pus, as indicated by the contents of the waste pail, is greatly increased. In some cases the discharge is augmented to a remarkable degree. A very small fraction of this increment can be accounted for by the more efficient drainage; after the first clearance of pus from a wound, drainage, no matter how efficient, would account for no increase in the discharge issuing from its mouth. As an ordinary wound contains, at any time, no more than a few drachms of pus, which would be scarcely noticed in a pint or two of irrigating fluid, there is a large residuum unaccounted for. An actually increased exudation from the walls of the wound seems to explain most reasonably this discrepancy. That this addition of pus in the early stages is due to a recrudescence of the infection is disproved by the general and local improvement in the case; reduction of swelling, induration and tenderness go hand in hand with the increased pus production.

An increased bacterial count is also a feature of the early stages of the treatment. Cases showing a count of one or two organisms per field before the treatment was instituted, gave after the lapse of twelve hours or so, a count of over one hundred per field; in fact, sometimes the organisms were too numerous to count. From this the bacteriological curve would drop, sometimes rapidly sometimes slowly, to its previous level, then below and finally to one or nothing in ten fields. This elevation of the count was always higher in old-standing cases with widespread induration; recent cases frequently showed little or no increase. Fig. 6 reproduces a typical curve, in a case of eight months standing. The abrupt initial rise was a source of some apprehension to us for a time until it was learnt that, in spite of the high counts, the wounds were progressing more favourably than ever before; we soon came to look upon them, not as evidences of stimulated microbial growth, but rather as signs of increased excretion. The more pronounced rise in the curve of old-standing, as compared with the recent cases, we construed as an indication that in the former the infection, during previous treatment, had had time and opportunity to travel farther afield and that the bacteria had entrenched themselves within the tissue depths whence ordinary means of drainage had failed to dislodge

them. This interpretation is borne out by the slower and more gradual decline of the curve in such cases, especially in instances where the infection has extended into bone.

Other facts which favour the view that the cleansing process extends well into the surrounding tissues are:

1. Wounds once healed have never subsequently "flared up".
2. The tissues for some distance surrounding the wound quickly become soft and pliable and lose their tenderness and swelling.
3. In several cases of skin-grafting by Thiersche's method, the grafts have "taken" everywhere without a sign of pus, though the cases, in the majority of instances, were, prior to treatment, very purulent and of long standing.

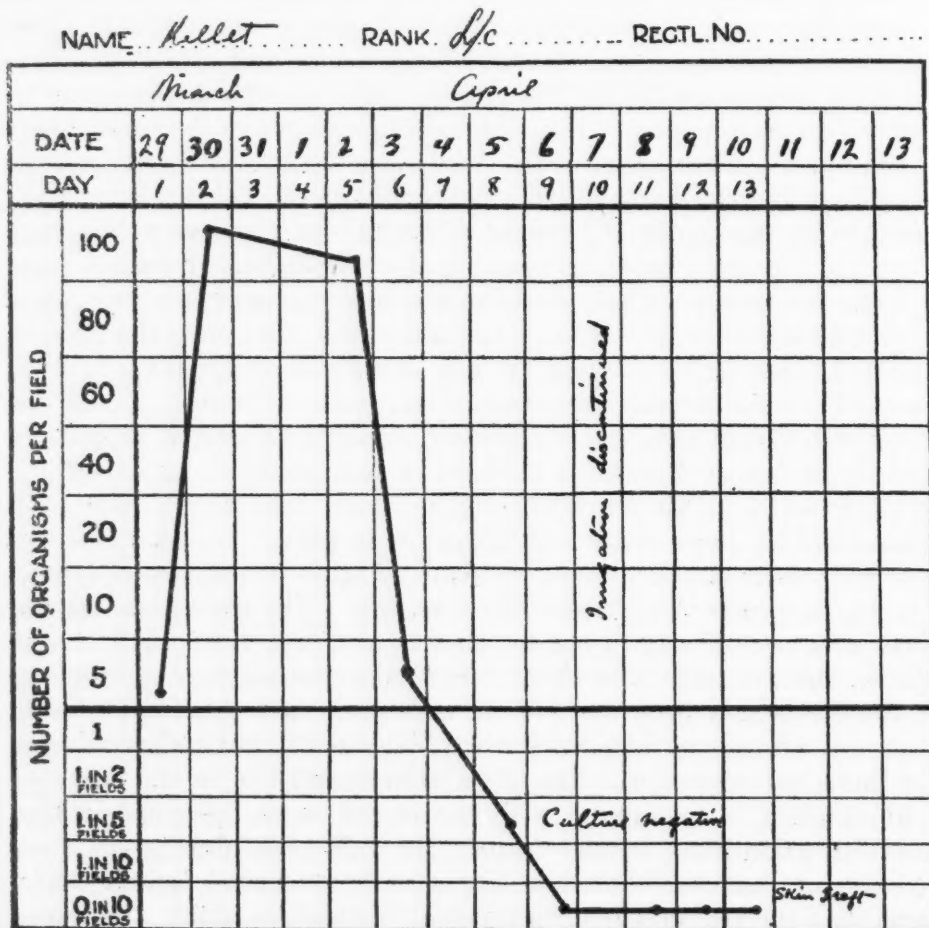


FIG. 6

The final question, whether or not the local blood supply is amplified, may be briefly dealt with. The appliance during the periods of negative pressure acts as a "cup". Its hyperæmic effect is usually quite evident; in fact, in acute cases this is sometimes too pronounced in which event the negative pressure will require reduction or abolition. Pain, however, as elsewhere mentioned, is our signal for reduction; hyperæmia devoid of pain is advantageous only.

In the cases treated up to date, though sometimes this and sometimes that feature would be enhanced, the results have shown a general uniformity. It is impossible in such a paper to give a detailed account of even a few of these. The following case, which is typical of the series, is given, not in any attempt to substantiate our arguments by a single instance—this would fail in logic—but solely with the view of illustrating by concrete example the characteristics of this method of treatment which have been set forth in the foregoing discussion.

Private C., wound on the posterior aspect of the knee joint, received October 24th, 1917, eight months prior to treatment. The wound is two and one-half by one and one-half inches and two and one-half inches deep. There is abundant discharge; pus is burrowing for a distance of an inch or two beneath the subcutaneous tissues. There is marked induration and tenderness for a radius of several inches surrounding the wound. There has been little or no improvement in the last two or three months.

Bacterial count, three to four per field.

Treatment commenced June 30th, 1918, and continued for six days. There was reduction of induration and tenderness in a few hours. Next day the bacterial count was over one hundred per field. The wound cavity, upon removal of the appliance, was found to be filled with clear irrigating fluid mixed with lymph; no pus can be expressed. The pus in the waste pail is very abundant, after standing for the twenty-four hours.

The appliance was removed at the end of the sixth day and not reapplied. The surface of wound is quite clean and covered with bright red granulations. Bacterial count, nothing in ten fields. Upon examining the wound after twelve hours of moist dressings, it was found to be filled with clear straw-coloured lymph; upon expressing this, blood alone appears. Wound healed July 27th—less than one month after treatment was commenced.

In the entire series of one hundred and twenty cases the average time which the wounds discharged previous to treatment was

about six and one-half months—196 days. The average duration of treatment was seven and one-half days. Many of the cases contained dead bone, so healing was not aimed at, but merely preparation for operation. Even in these cases the change in the condition of the wound was remarkable, surrounding inflammation subsided rapidly, and the discharge after irrigation had been discontinued was but a slight or moderate staining of the dressings. In these bone cases splendid results are obtained by a course of treatment prior and subsequent to the removal of the sequestrum—the after-treatment preventing re-infection.

### CONCLUSION

The subject of wound infections is a most fascinating one. There are not many of greater importance in war surgery, and there are few directions in which advance seems to promise larger benefits. It is probably true, as is sometimes remarked, that any wound, provided it contains no dead bone or foreign body, will close in time; but every day of discharge is a detriment and its effects in many cases are added to the final disability. The relative value of any method for the treatment of infected wounds must be measured by the rapidity with which it cleanses them.

What a miserable train follows prolonged infection—ankylosis or restricted movement of joints, destruction and sclerosis of muscle, necrosis and non-union of bone, to say nothing of lowered *morale*. Nor is the amount of the discharge always a true index of the damage which is being done; the secondary infective zone also requires attention. In a sense there may be such a thing as "laudable pus", we have all noticed that in cases with copious discharge the indurated, swollen and tender area is not so extensive; whereas in cases showing scanty discharge there may be widespread inflammatory signs. These phenomena, whose precise pathology is at present obscure, are probably akin to the cessation of urethral discharge which synchronizes with an acute gonorrhœal epididymitis. In like manner, the increased discharge which marks the first few hours of the irrigation, and the rapid subsidence of inflammatory signs in the tissues lying more or less remote from the wound cavity proper, appear to bear a reciprocal relation to one another. Herein may be sought the explanation of the end-results obtained by this method. This initial "catharsis" of the tissues,—marked increase in the bacterial count with forced discharge of



purulent material going hand in hand with lymphorrhoea; synchronizing, as it does, with subsidence of induration, tenderness and swelling, and followed shortly by a negative bacterial count and rapid decline in the amount of pus excreted,—we regard as truly significant.

In dealing with the question of infected wounds, final results are always exposed to the criticism of being no more than the outcome of natural, and perhaps unaided, tendencies toward repair, rather than of being the attainment of any particular procedure or method of treatment which may be advocated, and adopted at the time. We fully recognize the importance of searching with unbiased mind for the true significance of such results, and are sensible of the scrutiny to which conclusions, based to a large extent upon clinical observation, must be subjected; nevertheless, the results obtained by the method of irrigation, set forth in this paper, are of so outstanding and decided a nature, and the individual features consummating the final result so consistent and clearly-cut, as to invalidate any conclusion which does not attribute such findings to the mechanical methods of cleansing employed.

There are many questions to be worked out in connection with this form of irrigation, and with regard to infection generally. I hope, that at some, time opportunities to solve them will be given to us and others.

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SURGEONS of the French army have been carried in *aéroplanes* to stations behind the firing line when their services were urgently needed. Four surgical *aéroplanes* were completed for this use on the battlefields. The planes were capable of lifting three men—a pilot, surgeon and an *x-ray* operator—together with radiograph, surgical instruments and a small folding table in aluminum. They had a speed of from forty-five to seventy miles an hour, which enabled them to reach, for example, Noyan to Paris in an hour, whereas the lightest surgical motor took half a day.

## THE PENSIONABILITY OF THE DISABLED SOLDIER

LIEUTENANT-COLONEL J. L. BIGGAR, C.A.M.C.

**N**O apology is needed for a further discussion of the problem of the disabled soldier. Of all the questions that will have to be decided by the people of this country within a few years none presents any greater difficulty, or is likely to entail more errors of judgement, than the duty owed to those citizens who served the State by a personal participation in the battles for its freedom, and suffered a physical detriment thereby.

Several articles have appeared within the last few months bearing upon the various phases of the work of the medical profession in connection with these men. From these articles one gathers that the duties and responsibilities of the Board of Pension Commissioners are not generally understood. Indeed it is fairly obvious that sentiments natural to the most humanitarian of all professions have influenced judgement more than is fitting to the unemotional scientific mind. Medical men will realize that the opinion of the whole of Canada will be greatly influenced by their attitude towards this problem. It therefore deserves their consideration from every angle, especially with a clear realization of their duty to the State, as well as to the individual soldier or sailor in whom they may be interested in a professional capacity.

The Board of Pension Commissioners is a body appointed by the Parliament of Canada to administer regulations regarding pensions; to determine the pensionability of a discharged soldier or sailor or his dependents; to award him pension; to pay the money to which he or they are by such award entitled; and to increase, decrease or discontinue a pension, previously awarded, as may be indicated. Whatever opinion anyone may have, regarding the pensionability of a discharged man or his dependents, the whole responsibility for action lies with the Board, and its decision is final.

The Board stands in the position of a trustee for the member of the forces and is at the same time the servant of the State. Its function is judicial. Its verdicts are the outcome of an unbiassed

consideration of the facts in each case. Its limitations are those imposed by the citizens of the country, through their Parliamentary representatives, and contained in the pensions regulations; these it has no power to alter or modify.

A pension is awarded for total or partial disability—a word commonly used and not commonly understood. A man is not pensioned because he has lost his eyes, but because, having lost his eyes, he cannot see. He is not pensioned for a wounded shoulder, but because he had lost his full ability to use his arm. In other words he is pensioned for the loss, partial or complete, of a normal ability; which, in fine, is the exact meaning of the word disability.

A disability thus defined reduces a man's capacity for ordinary employment. This capacity may be reduced (1) because by reason of his loss of a normal ability his choice of occupation is restricted; (2) because he is, by reason of his disease, prohibited from undertaking certain forms of work; (3) because he, by reason of his disease or injury, requires more rest than the normal man.

As examples one might suggest that the man who has lost his sight is restricted in occupation because he cannot undertake watch-making, or other work requiring vision. The man suffering from pulmonary tuberculosis, even apparently cured, is prohibited from occupations involving his remaining long hours in a bad atmosphere. The man with a poorly compensated valvular lesion of the heart is handicapped by the need of finding such an employment as does not necessitate physical exertion of any kind.

It is obvious that the first duty of the Board of Pension Commissioners lies in determining the extent to which any given disability handicaps its possessor in regard to his capacity for ordinary work, or, in another phrase, his employability in the general labour market—It has then to elaborate a scale of such handicaps, beginning with those that render their possessors unemployable,—generally but improperly known as “Total Disabilities”, and placing each lesser handicap in its proper relation to these.

A “total” or any lesser disability may be derived from different causal diseases or injuries; that the causes of a given disability may be many and various is in a measure immaterial from the pensioning standpoint. The problem before the Board never varies; it consists in the determination of the extent to which the ex-soldier or sailor is, by reason of the physical detriment resulting from his service, handicapped in his capacity for ordinary work.

The main difficulty in the determination of pensionability lies in the realization of what constitutes normal employability

in the general labour market, or normal capacity for ordinary work. This does not mean capacity for manual labour only, but for the whole round of employments open to the normal healthy unskilled individual.

The pensions regulations specifically provide that pensionability shall be determined without any reference to the applicant's previous occupation. The fact that he cannot return to his former employment, at which perhaps he earned a large wage, does not entitle him to any larger pension than is awarded to his fellows labouring under the handicap of a similar physical detriment.

The regulations also provide that the amount of money payable for a condition of "Total Disability" shall be \$600.00 per annum, with extra allowances for wife and children. This is the sum fixed by parliament as that necessary to keep a man, unable to provide for himself, in "decent comfort." The Board of Pension Commissioners has no power to alter this "Total Disability" award. It is instructed, however, to determine what proportion of this "total" shall be awarded for lesser disabilities.

The determination of what detriments constitute a total disability and of the correct relation borne by lesser disabilities to this "total" has involved much labour. The literature on this question in our own and other languages is extensive, and has had to be most carefully and thoroughly sifted; the application to Canada of the fractions currently employed in other countries has not resulted by any means invariably satisfactorily; a very considerable amount of careful study has been found necessary to establish fractions equitable for this country.

The results of the investigation of this problem by the Board of Pension Commissioners are embodied in the table of disabilities issued by the Board to its examining medical officers throughout the country. Necessarily the figures contained therein are subject to change as knowledge increases; but they are, however, the most accurate and equitable obtainable for Canada to-day.

The table is the outcome of a very considerable amount of investigation into a special branch of medicine. Application to an individual case is a form of specialized professional work.

Two facts bearing upon this statement deserve complete realization: (1) The physician devoting his attention to the treatment of the disease cannot afford the time necessary to the accurate determination of its result in the individual affected in regard to his employability or capacity for work in the general labour market; (2) the disability table cannot be so elaborated as to



lay down the specific percentage for each variation of disability resulting from every disease and injury. The experience gained by the medical staff of the Board of Pension Commissioners by the consideration of thousands of cases puts them in the best possible position to arrive at a just conclusion in any individual case.

Suggestions are not infrequently made that the Board of Medical Officers which examines the soldier or sailor on discharge is more competent to determine the extent of his pensionability than the medical advisor to the Board of Pension Commissioners can possibly be. In effect the statement is, "We see the man and can determine from our examination of his body what sum of money he should receive from the State. You only see our description of him and are therefore obviously much less able to decide this question."

This statement is most plausible; and most erroneous. In the first place the disease or injury which is the matter of primary importance to the Board of Medical Officers and with the diagnosis treatment, and description of which they are essentially occupied, does not automatically determine pensionability. One does not need to label the point that in most diseases the incapacity for work may and does vary from zero to 100 per cent. This fact is recognized in the table of disabilities in which such statements as "according to incapacity" or "up to 100 per cent." are to be found opposite many conditions. In the second place, a board in Halifax, estimating the incapacity of a man suffering from, let us say, asthma of a certain degree of severity, puts his pensionability at 75 per cent. Another board at Vancouver estimating an exactly similar case puts the pensionability at 25 per cent. Each board might be consistent in its own awards but utterly inconsistent with the awards of other boards.

It is obvious therefore that a clearing house is necessary. If consistency is admirable in an individual, it is essential in a department of the government: the law must be the same from the Atlantic to the Pacific. This consistency is the ideal towards which the Board of Pension Commissioners strives. Doubtful cases are thoroughly discussed: new cases are debated that new precedents may be established: the elasticity of the figures given in the table (viz:—"from 10 to 50 per cent.—up to 40 per cent.") is used by members of the staff, working day after day on cases of the same sort, to deal justly with each applicant; in short every effort is made to arrive at a complete realization of the disability in each case and to award exactly that pension which it justifies.

Another feature of the work of the Pension Board deserves particular mention in this connection. It is essential that the justification for the expenditure of public money should in each case be clearly stated and carefully recorded. The documentary evidence by which this justification is arrived at and the essential reason for the expenditure it warrants form a part of the official records of the government. These must be available for Parliamentary consideration at any time. They must also be available for reconsideration by the Board in cases of appeal against its original decision, for adjustments of pension in cases in which the disabling condition has lessened or increased since the original award, and for the determination of the pensionability of dependents in cases in which the pensioner has died. It would be extremely difficult, if not impossible, to provide records fulfilling these requirements if awards of pension were made by numerous boards scattered across the Dominion.

To judge correctly, it is obvious that all the facts regarding a disabling condition must be presented. The best report is that which describes carefully and thoroughly the anatomical condition of the affected organ or member and gives in a comprehensible form its measure of functional capability. When this is done the matter of the determination of the proper award is comparatively simple. The difficulties of a correct determination arise from the fact that doctors, both military and civilian, find it hard to appreciate the purpose for which their reports are used. A recital of facts sufficient to justify discharge from the Army is not sufficient for pensioning purposes. What is required is a perfect case-history, and the writing of these is not a sample nor a universal accomplishment. The record should be a statement of the physical condition of the man examined, in which each symptom mentioned is accounted for by its necessary objective signs, each anatomical defect is described with its concomitant symptoms, and no loose statement, obviously incorrect on the face of it, is allowed to appear. The civilian practitioner labours under an additional handicap in that his natural sympathy for the disabled soldier or sailor undoubtedly tends to affect his estimate of the severity of the disabling condition.

Occasionally cases have occurred where the desire to assist the patient financially has obviously been the predominant motive in the writing of a report or certificate. In one case this was so glaring that steps were successfully taken to have the offending physician struck off the rolls of his provincial council and thereby

deprived of his license to practise his profession. In any event this sacrifice of professional integrity upon the altar of a mistaken humanitarianism is easily discovered by a comparison of the incorrect description with those of earlier dates on file; it tends therefore, to prejudice rather than to help the applicant's case, and merely adds to the labour of the medical advisor's staff.

Undoubtedly the realization of the importance and the purpose of these records must inevitably tend towards perfection in their composition. The fact that inaccuracies or omissions injure either the doctor or his disabled fellow-citizen should invariably be borne in mind.

To summarize, there are three powerful arguments in favour of the centralization of the business of awarding disability pensions.

1. It is a specialized branch of medical work requiring for its proper performance special training, as do other specialties.

2. It is essential that the pensions awarded shall be, so far as is humanly possible, equal for equal disabilities.

3. It is imperative that the statement of the facts justifying the award shall be clearly and comprehensibly made, carefully preserved, and available in the case of future enquiry or appeal.

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"Bip" is one of the few words that will be added to the dictionary as the direct outcome of the war. "Bip" is a combination of bismuth, iodoform, and paraffin paste, and is the name given to one of the most important surgical discoveries of Dr. Rutherford Morrison, the famous operative surgeon. By the new process the destroyed tissues and infected areas are excised, the parts thoroughly drenched with pure spirit and after the application of a thin layer of "bip" the wound can, in many cases, be sewn up immediately with every prospect of primary union and no further distress to the patient. Even wounds associated with bone injuries or damaged joints have been successfully treated by this method, and compound fractures have lost much of their seriousness. A London military hospital records a marvellous case of a piece of shell which penetrated a soldier's chest and diaphragm, passing into the abdominal cavity. These terrible injuries were inflicted without subsequent ill consequences, the track of the missile being excised and the wound sutured after a thorough application of "bip". Similar success has been attained in cases of gas gangrene since the germs of this infection can no longer thrive.

## MEDICAL SERVICES OF THE DEPARTMENT OF SOLDIERS' CIVIL RE-ESTABLISHMENT

BY LIEUTENANT-COLONEL F. MCKELVEY BELL

*Director of Medical Services, Department of Soldiers' Civil Re-Establishment*

**T**HE care of the invalided soldier is divided roughly into two stages:

1. Before discharge, by the Department of Militia and Defence, and
2. After discharge, by the Department of Soldiers' Civil Re-Establishment.

It is apparent to the casual observer as well as to the physician that in a large proportion of cases the soldier returning from the front presents a temporary condition of altered mentality which, as compared with the average civilian, may be looked upon as abnormal.

It is not to be wondered at that after months or years of intensive physical and military training, and after months or years of untold hardship and mental strain, the soldiers who have fought so heroically in this super-war should present neurological or psychopathic conditions which in former wars were almost unknown.

It is estimated that it takes approximately one year to train a civilian to become an efficient soldier, that is, to teach him discipline, to teach him to submerge his own individuality and desire for personal initiative and to fight with the other members of his unit in such a way that the unit will act as a homogeneous whole. It is not surprising that the soldier, for whom everything is provided by the State, should lose, to a certain extent, his sense of personal responsibility. In order that the machine may be effective, the various parts of that machine must lose their identity. For the good of the Army it is necessary that the soldier should



have no worries and that his every effort should be devoted towards the one purpose, viz.: efficiency in fighting.

If, then, it takes a year to convert a civilian into a soldier, in thousands of cases it takes as long to re-establish him as a civilian.

The returned soldier is, as a rule, nervous and restless. He has been accustomed to rapid changes of life and environment. His duties were associated with a constant panorama of moving scenes and endless excitement, and he has been subjected to the merciless effects of intense bombardment and to the continuous shocks which are incident to the battle-front. It cannot be expected that he will settle down to the humdrum existence of civil life or that his initiative may be invariably relied upon without judicious encouragement. Continuity of effort is essential to success and a restless state of mind precludes steadfastness to continuous and uneventful labour.

For the purpose of assisting the returned soldier to again take up the duties of citizenship, the Government of Canada has authorized and established the Department of Soldiers' Civil Re-Establishment, whose duty it is to assist in every way the return of the ex-soldier to normal and successful civil life. It is no reflection on the brave boys, who have given of their best, that they need help and encouragement in their return to a life from which they have been long estranged and under such exceptionally trying conditions. All honour to them that they have succeeded in the new work which they undertook and have carried out so successfully in the defence of their country. The problem of the civil re-establishment of the disabled ex-soldier and ex-sailor is one, however, which needs to be approached without sentimentality but with an understanding sympathy. The physician, the surgeon, the educationalist, the business man, the manufacturer, and every worker whose services are employed in this most important undertaking, need to approach the subject with a deep sense of their responsibility to the individual and to the State.

The medical problems involved are complicated and present a kaleidoscopic variety: the neuropath, the limbless, the blind, the tubercular, the epileptic, the various new conditions incident to the present war, and the chronic cases. As soon as the returned soldier who is crippled or rendered partially disabled by disease or injury can be made to realize that life still holds interests for him in the manufacturing, the educational, or the commercial world, and that there is a department which is ready to do every-

thing necessary to help him overcome his handicap, so soon will a step forward have been made in connection with his rehabilitation and his return to useful civilian life. The knowledge that he can still be self-supporting in spite of the handicap of the loss of limbs or of other serious defects, assists him to regain pride in his own personal effort and encourages him to make a strong endeavour to become self-supporting.

The special duty of the vocational branch of the Invalided Soldiers' Commission is to teach new occupations to men who, through disability or disease contracted on war service, are unable to return to their former employment. At the present time, about three thousand ex-soldiers and sailors, from the Atlantic to the Pacific, are attending classes and learning new occupations under the care of the vocational branch. Over two hundred varieties of trades and occupations are being taught throughout the Dominion and the men have shown that they are anxious and willing to learn, and make themselves independent once more.

At the end of August approximately fifteen hundred disabled men had graduated from the courses given by the Department and had found employment. It is interesting to know that recent figures show that on the average these men are receiving about 25 per cent. more in earnings than before the war and this notwithstanding their war disabilities. This is in addition to any pension which they may be receiving.

The knowledge that their pensions will not be reduced by reason of the fact that they have become self supporting has been a factor in stimulating the men to greater effort. In earnest work the returned disabled soldier finds once more contentment and a normal outlook on life.

The medical aspect of industrial re-education presents three phases:

1. The examination of the man to determine whether or no he will be able to carry on in the occupation which he wishes to learn.

2. His medical care whilst undergoing industrial re-education, for it is important that there should be no return to idleness or the least break in the continuity of his training.

The Department of Soldiers' Civil Re-Establishment gives these men medical care during the period whilst undergoing this training whether their sickness or disability is the result of war service or not. The ultimate economic value of such an arrangement is easily understood.

3. The medical examination of the industrial worker whilst taking his course of training in order to ascertain whether or not the work is having a deleterious effect upon his disability.

It is important that wherever possible the vocational medical officer should have some knowledge of mechanics or some knowledge of the various industries in which the men are about to engage. It is a matter of considerable difficulty for the average physician to estimate just what disabilities or diseases preclude the various occupations, but experience in this branch is being rapidly gained by the physicians who have undertaken this important and interesting phase of the work of rehabilitation.

The Department of Soldiers' Civil Re-Establishment is charged with the medical care of the tubercular, insane, epileptic, incurable and chronic cases or cases of long duration, and with the treatment of recurrences of war disabilities of every kind. Approximately one thousand of the last named class of cases are at present under treatment. A chain of sanatoria for the treatment of tuberculosis has been established from coast to coast. In some cases the provincial institution has been considerably enlarged by this Department; in other cases large hotels have been taken over and converted into temporary sanatoria and in still other cases sanatoria have been purchased or are being built.

It is satisfactory to know that a large proportion of cases of tuberculosis of the lungs either recover or become arrested. Cases of tuberculosis are discharged from the Department of Militia and Defence as soon as diagnosed and are taken on the strength of the Department of Soldiers' Civil Re-Establishment for clothing, pay and allowances, and medical treatment. In so far as their physical condition will permit they are given classes in vocational training or industrial re-education while undergoing treatment.

There is no doubt that vocational training such as is given in the various sanatoria has a marked curative value in the treatment of tuberculosis. The patient does not find his stay in the sanatorium uninteresting or wearisome. He has something to occupy his attention and to keep up his interest in life. He has little time to brood over his condition. Arts and crafts, cabinet making, wood-work, basket weaving, gardening, stenography, telegraphy, etc., as well as the general education are all taught in the sanatoria. Whereas, in the early years of the war, before vocational training was introduced in the sanatoria, it was difficult to retain the patients, who often became restless under the

monotony of sanatorium treatment, under the present system it is seldom that they are not contented to remain until their cure is satisfactorily advanced or completed.

Up to the present, with the exception of the Newmarket Hospital (150 beds) close to the city of Toronto, the permanently insane have been taken care of by the Department of Soldiers' Civil Re-Establishment in the various asylums or hospitals for mental diseases throughout the Dominion. In some provinces this arrangement has proved quite satisfactory, but in a few cases the local asylums are not all that could be desired, and it is probable that one or two more institutions will have to be built by the Department of Soldiers' Civil Re-Establishment in order that insane patients may receive the most up-to-date treatment and the best care which it is possible to provide.

It is expected that an Epileptic Colony for the care and treatment of ex-soldiers suffering from this condition will be opened up during the year 1919. This will take the form of a farm colony and will probably be based upon the same system which obtains in the large epileptic colonies of the United States where industrial training, farming, fruit growing, etc., is made a part of the daily routine. At present there is no law whereby epileptics may be placed in institutions without their consent, but in so far as such patients or their guardians may consent to institutional treatment or to segregation, they can be taken care of at such a colony, under the direction of the Department.

It is impossible to overestimate the importance of this new Department or to outline at the present time the vast extent of the work which the future will demand, but it is conceivable that, with a half million enlistments, the work will be very extensive and for many years to come will call for the employment of the best surgeons and physicians in the land.

As a temporary measure, the Department of Militia and Defence has arranged that ex-soldiers or sailors may be returned as civilians to military hospitals for treatment of recurrences of war disabilities after discharge from the service. This has prevented any confusion or break in the continuity of treatment. However efficient our military hospitals may be,—and they are efficient, the return of the ex-soldier to them places him in the anomalous position of a civilian in civilian clothing in a military environment where the other patients are in uniform and under military discipline.



The principle of a civilian department taking medical charge of the ex-soldier is recognized as a sound one and has been adopted in Great Britain.

While in certain orthopaedic and neurological cases it is desirable, wherever possible, that the discharged soldier should be returned for treatment under his former military physician or surgeon—and this policy is being followed in general—this is not always practicable. In many instances the patient has been transferred from one part of Canada to another and is far removed from his former station. As a civilian too, the patient often has strong objections to being returned to a military institution for treatment and claims as his right that he should be placed in a civil hospital.

Apart from the consideration of the patient's personal wishes, it is essential that his commencing re-establishment in civilian life should not be interrupted or again influenced by periodical returns to a military environment.

Now that the war is over, and the work of the military hospitals within a few months will reach its height, it is altogether probable that the number of patients discharged to the Department of Soldiers' Civil Re-Establishment will rapidly increase; and with this increase in work it is proposed to establish general hospitals throughout the various provinces of the Dominion. In most instances it will no doubt be possible to secure hospitals which are being utilized at the present time by the Department of Militia and Defence.

There can be no doubt that the sooner the soldiers are in a fit physical condition to be discharged from the army and placed in civil hospitals, the sooner they will commence to think of their future, and to realize the necessity of again assuming personal responsibility with regard to making a livelihood—an end which will assist greatly in the problem of rehabilitation.

The Drummond Street Hospital (250 beds), Montreal, has already been transferred to the Department of Soldiers' Civil Re-Establishment, and is the first of the general hospitals to be organized and established by this Department.

One of the principles of the Department of Soldiers' Civil Re-Establishment is, that, as far as possible, ex-military medical officers who have had experience overseas shall be employed in the treatment of these patients in civil or Soldiers' Civil Re-Establishment hospitals. The Department with its medical and

vocational services—its re-educational system for the disabled—will do much to avoid what in former wars seemed inevitable, viz.: large institutions for the cure of the crippled and inefficient. The great mass of disabled soldiers to-day know that much may be done for them, and in this knowledge they are striving earnestly and successfully toward the goal of efficiency and self-support.

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THE keynote of modern surgery is simplicity. Belief in the virtues of absolute cleanliness in surgery as represented by a thorough use of soap and water in the place of many antiseptics, is coming into the foreground. It was obvious that antiseptics might kill germs, yet they did not necessarily remove dirt, and now the most careful surgeons regard soap and water as the common defence against infection, and the thorough use of it better than if an antiseptic is employed. To this advantage may be added others. Healing of wounds goes on without much fever, and in most cases the men are convalescent in ten days. As a rule it is not necessary to put in drainage tubes, for there is little discharge. Germs that ordinarily infect wounds are driven out with the dirt and succumb to the natural influences of cleanliness and fresh air. Apart from the question of wounds and personal cleanliness, experience shows that there is little value in the ordinary methods of fumigation and disinfection, unless soap and water and energetic use of elbows are first employed; and this is a remedy that every one can use with safety.

PRELIMINARY REPORT ON INFLUENZA  
EPIDEMIC AT BRAMSHOTT IN  
SEPTEMBER-OCTOBER, 1918

BY C. E. COOPER COLE, B.A., M.B.

*Lieutenant-Colonel C.A.M.C., No. 12 Canadian General  
Hospital, Bramshott*

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INTRODUCTORY NOTE BY

COLONEL R. D. RUDOLPH, C.B.E., M.D., F.R.C.P.

*Consulting Physician to the Canadian Forces in England*

Colonel Cole and his officers have had a most extensive experience of influenza in the recent epidemic. The notes of the complications of the disease are very valuable, for example—the frequent rupture of the recti-abdominales muscles. I have not been as much struck as the writer was by the factor in the disease.

The frequency of relapses has been very noticeable, these relapses often occurring several (in one case ten days) after the temperature had originally returned to normal. Such relapses occurred while the patients were still in bed and hence were not due to any chill or exhaustion.

The mortality of the cases admitted to hospital works out at 7.25 per cent. and of all the cases reported in the camp, 3.6 per cent., which is noticeably higher than in the original epidemic of the spring, but low as compared to some reports of recent ravages. Death was practically always due to respiratory complications.

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**A**FTER the outbreak of influenza in May and June, our hospital had only occasional admissions of cases of this disease until the latter part of September. On the twenty-fourth of that month three cases reported, and on the succeeding days nine, seventeen, twenty four, twenty-six, reaching a maximum of one hundred and

seventy-four on October 5th. Since then the epidemic has been abating and on November 7th the total "flu" admissions were only twelve.

In all, 2,247 cases have passed through hospital out of an incidence of about 4,500 cases in the area. One hundred and sixty-three had a fatal termination, the period of illness varying from five to twenty-seven days, and the pathological changes affecting the lungs or myocardium.

The usual history was of sudden onset of chilly feeling, headache, general aching, and weakness with dizziness. Then cough and tightness in the chest with glairy sputum and very frequently epistaxis. Objectively an indescribable foetor was present in even the mildest cases, and, in the very severe, was almost overwhelming. It disappeared before complete recovery of the patient. The febrile course of the disease varies from twenty-four hours to fifteen days, continuous fever, running as high as 106°6, inclined to be remittent and ending by lysis. The types might be considered as (a) mild, temperature becoming normal within three to seven days without disturbance of pulse or respiration. Considerable weakness persisted and renal irritation was usually present. Even these mild cases showed tendency to tachycardia or slight exertion in convalescence. (b) The next grade of severity ran a central course of five to twelve days with high fever, marked cyanosis or livid pallor and rapid respiration; all evidences of severe toxæmia, with very few signs in the chest except of the diffuse emphysema or of a bronchitis down to the capillary tubes with sputum moderate to copious, glairy to muco-purulent, to yellow-green purulent, becoming dirty sanguino-purulent to dark clotted blood. In some cases bright red blood was expectorated, as much as four ounces at a time and one case, for which no other cause could be found, proved fatal from hæmoptysis. A number of these cases proved fatal, and shewed peribronchial induration or patchy central broncho-pneumonia. (c) The most severe types were either (1) primary marked bronchitis with profound toxæmia, rapidly becoming pneumonic, or (2) a primary toxic type as in (b) above, the temperature falling to normal or thereabouts for one to six days and then rising again to a secondary severe pneumonic course, with a frequently fatal issue.

Some peculiar clinical and pathological features were noticed in this series of cases. In the first place very marked foetor of the exhalations, so offensive in some cases as to render careful chest examination difficult, was pathognomonic.



*The respiratory tract* shewed marked congestion from the nares to and through the pleura. The respiratory rate was frequently out of all proportion to pulse or temperature, fifty to the minute being often maintained for a week, with pulse not above 110. Rhinitis with epistaxis, often recurrent, was present in over one-third of the cases. Pharyngitis, tonsillitis, laryngitis, and tracheitis (often pseudo-membranous causing dyspnoea, stridor and inspiratory retraction of lower ribs), bronchitis and bronchiolitis. The cough shewed several types—(1) explosive, (2) paroxysmal, closely resembling pertussis and in a few cases was (3) "brassy". The bronchitis, at first dry, afterwards usually became moist with abundant mucopurulent sputum. The inflammatory condition extending deeper, lobular and pseudo-lobar pneumonia of variable extent developed. Fibrinous, sero-fibrinous and sero-purulent pleurisies occurred, sixteen cases shewing definite empyemata, streptococcic more frequently than pneumococcic on direct smear. Compensatory emphysema often developed out of proportion to areas of consolidation and in twelve cases with severe chest signs interstitial emphysema developed in the mediastinum and so extended up to the malar eminences and down over chest and abdomen. Only one such case recovered. Most of these cases shewed definite small pulmonary abscesses either in continuity with the mediastinum or parietes. No cases of pneumothorax were observed. Areas of hæmorrhage into the lung tissue were so often seen, in various stages from recent occurrence to liquefaction, that this condition might be considered almost pathognomonic of the disease. One very toxic case died from sudden onset of pulmonary oedema on the eighth day with very little consolidation. Several cases shewed only "purulent bronchitis". Four cases shewed activated pulmonary tuberculosis. Two of these became miliary, two miliary of the lungs, and one of the latter developed tuberculous basal meningitis.

*Circulatory effects.* The early cyanosis was toxic rather than from asphyxia. The tongue itself was often of dark indigo and the whole body of a lilac tint for several days before death. Pulse usually relatively slow, *e.g.*, respiration 40, pulse 88, temperature 104 degrees and often dicrotic. The systolic blood pressure in previously healthy young adults often ran below 100 mm., and the diastolic could hardly be estimated. In only one case was recent pericarditis found and no recent endocarditis. The main change was myocardial but rarely accompanied by right heart dilatation. The circulatory failure was often of very sudden onset, a pulse of 100 of

good quality becoming 140 within two hours, and ceasing in less than four. The blood itself clots readily, though purpuric eruptions were noted in some cases, as well as hæmorrhages into the lungs and muscles. Phlebitis, brachial and saphenous, was not rare. There was usually a leucopenia, 2,400 to 9,000 white blood cells per c.cm. in purely toxic cases and even in extensive broncho-pneumonia, but with pulmonary abscess formation, empyæma or other septic complications, the count shewed from 9,800 to 24,000. This leucocytosis or else the local reaction seemed to render the prognosis more favourable though not invariably so.

Blood cultures were negative whether taken early or late.

The superficial and deep cervical and axillary lymph glands were almost constantly enlarged in severe cases. The peribronchial glands were much swollen and occasionally almost broken down. The intestinal and mesenteric glands were not enlarged even in the cases with diarrhoeal symptoms. The spleen was rarely palpable nor found enlarged post mortem.

*Digestive manifestations* were variable. The usual febrile mouth with excess of slimy and most foul mucus. Amorexia, nausea, and vomiting were frequent, the latter usually exceedingly forcible, the vomitus consisting of large quantities of bright green fluid. Epigastric pain with some rigidity was a frequent complaint and jaundice of considerable degree was usually of bad omen, fairly marked hepatic degeneration and occasionally perihepatitis being found post mortem. Independent of purgation, several cases of profuse bloody diarrhoea and two of watery diarrhoea with severe colic occurred. Splenic and hepatic enlargement were rarely present. Abdominal distention was usually a late unfavourable sign. Lieutenant-Colonel J. G. W. Johnson had to operate on five cases of influenza complicated by appendicitis and found one gangrenous, one perforated, with abdomen full of cloudy fluid, and three acute catarrhal with the terminal inch of the appendix much congested. At autopsy many appendices shewed a peculiar bulbous terminal inch, with marked congestion of surface veins. In one case a mild serous effusion and in several enterospasm with slight ascites was observed. No lesions were observed in the gross in the bowel wall.

*Genito-urinary signs.* Pain across lumbar region was a common complaint and in almost all febrile cases a mild nephritis developed—albuminuria, red blood cells and white blood cells, granular and hyaline casts being observed. In several cases the urine was distinctly bloody with decrease in quantity. Retention occurred in several,

but not suppression. No renal œdema was observed. Post mortem, many kidneys were acutely hæmorrhagic resembling scarlatinal nephritis. In over half a dozen cases there was swelling of the testicle and its coverings. One fatal case shewed the coverings principally involved and gangrenous, streptococci present in cultures. The others cleared up without suppuration. There were over thirty cases of swelling of the parotid gland and capsule, occasionally bilateral, sometimes associated with the preceding. These were not clinically epidemic parotitis, but allowed free movement of the jaws and the duct mouths shewed little change. One case suppurated. This complication occurred in one patient who had had mumps before.

*Special senses.* Hearing was very commonly dulled and Captain J. A. Atkinson reported frequent occurrence of hæmorrhage into the tympanic membrane. This occurred in some cases without pain, but in about forty there developed acute otitis and one quarter of these had mastoid involvement. Four cases of frontal and ten of maxillary sinusitis were observed. Loss of sense of smell with foetid purulent nasal discharge and copious repeated epistaxis were observed. In several cases over twelve ounces of blood were lost at one bleeding, and packing had to be resorted to.

There was marked periocular puffiness as in whooping cough with conjunctival injection going on to pus formation and occasionally blepharitis was present.

*Cuticular.* Very frequently marked miliary sudaminal rash was present. Occasionally patchy purpura, punctate erythema, jaundice, and cyanosis, either turgid, livid, or ashy. One case shewed purpuric blebs. Some very delirious cases shewed marked *tache cérébrale*. Interstitial emphysema occurred as described, Erysipelas of the face and the trunk with various local abscesses in the scalp, axilla, epitrochlear gland, and thigh occurred complicating the disease.

No definite *joint* lesions were observed but arthralgia in knees and shoulders was complained of, while a rheumatic fever, a gonorrhœal and a rheumatoid arthritis were lit up by the influenzal attack.

*Myalgia* and muscular weakness were very common symptoms. Abscesses were found in some muscles and marked degeneration was repeatedly noted in the rectus abdominis. The muscle looked grey, cooked, and readily flaked, three hours after death. Often there was marked hæmorrhage, as much as two ounces, into the

sheath of the rectus, and the muscles themselves were frequently found spontaneously ruptured as cleanly as though cut with a knife. The hæmorrhage was sometimes present throughout the length of the sheath from the costal cartilages to the pubis though usually only in the lower quarter. Myocardial degeneration was frequently very obvious at section.

*Nervous system.* Frontal headache and retro-ocular pain were of moderate severity. No breakbone pains were encountered. Pupils were normal and reflexes normal except knee-jerks, which were often difficult to elicit. Mild paræsthesia, involving the right leg, was noted in one case, and a transient Bell's palsy in another. Sleeplessness from toxæmia, not air hunger, was a trying symptom. In cases with fever, even of short duration, a low muttering delirium with tremor, singultus, and carphologia and occasional loss of control of organic reflexes, was frequently observed. Quite a number were very noisy and active in their delirium. Convulsions, cervical rigidity, opisthotonos and tetanoid spasms of hands and feet occurred in several cases: only one recovered. The spinal fluid was clear and culture negative. No increased cell-count was noted except in two complicating cases, (a) a hemiplegia due to tuberculous basal meningitis, confirmed post mortem, and (b) a case with marked stupor which is now apparently convalescing, but which has repeatedly shewn an increased cell-count on puncture with as much as 80 per cent. lymphocytes, and one film on one occasion shewed acid-fast bacilli. The brains, with the exception of one of these cases, have shewn no gross change.

The pathological work quoted above was in the main done by Captain A. Montgomery of this hospital.

*Treatment.* For purposes of treatment, our patients were divided into three groups under Major Pope, Major Shannon, and myself. All patients were put to bed in moderately cool rooms at earliest moment available, usually the fifth or sixth day of disease, and were not allowed up until the temperature had been normal for at least three days. In spite of this precaution one very mild case, whose chest had been negative, after a few hours up, developed a massive lobular pneumonia with evidence of myocardial degeneration and died within forty-eight hours. Posture in bed was used to allay cough and also to promote expectoration.

Fluids only, and very freely, composed the diet, on a basis of four pints and four eggs per sick man.

The initial purgative was in most cases calomel and epsom salts, the latter to be repeated as necessary, often with very marked



effects in lessening toxæmia. Simple enemata were also used, and turpentine for distension, effectually.

Local binders, mustard leaves, and plasters, poultices and cups were all used with relief of chest pain.

For various types of cough, balsamic inhalations were used as required, sedative and stimulant expectorant mixtures as indicated.

In some cases venesection relieved the toxæmia, especially if combined with (1) saline or (2) glucose and saline interstitially, intravenously or per rectum. Oxygen alone, or through alcohol was helpful in some purulent bronchitic cases, either continuously through Haldane apparatus, or intermittently by open method or subcutaneously.

The preliminary headache, general aching and chilly feeling were relieved by phenacetin, aspirin and Dover's powder, with hot drinks, in small doses.

Groups of cases were put on—

1. Urotropin.
2. Quinine sulphate.
3. Salol.
4. T. quinine ammon.
5. Soda salicylate.
6. Salicin.
7. Creosote and potash iodide.
8. Oil cinnamon.

These were all used in varying doses and none were found to exercise any specific effect. Acid carbolie was not used owing to frequent renal irritation.

9. Sera.—Anti-diphtheric, pneumococcic, streptococcic, staphylococcic, the last three being polyvalent, also normal horse serum, were used and seemed, in some cases, to reinforce the patient's resistance, but not to exert a specific effect.

10. Eusol has been tried intravenously, dose up to 250 c.c., so far with uncertain benefit.

To reduce temperature—(1) Sponges tepid to cold, or alcohol rub if above 104 degrees. (2) Cold pack to neck and chest. (3) Purgation and enemata. (4) Aspirin, grains 5 for single dose if not responding to the above.

Stimulants—Fresh air and oxygen, brandy or whisky up to an ounce every two hours, strychnine and atropine, strophanthin,

various digitalis preparations, camphor in oil, pituitrin, and adrenalin were each used, as indicated. Intravenous saline with or without glucose, 25 per cent. was also used.

Sedatives—Cool sponging, chloralamide, ammonium bromide and chloral, veronal, codein, heroin, hyoscine, morphine and atropine, Dover's powder, all p.r.n.

From the multitude of agents employed their comparative futility is obvious. The line to follow in treatment is "*primum non nocere*" and the more expectant and symptomatic the course, the more satisfactory will be the result. This becomes particularly plain on observing a very large series of cases such as the present epidemic has afforded us. The natural variations in the course of the disease are legion, our influence on them is problematical.

*Prognosis.* Early cyanosis, high fever and rapid respiratory rate are usually unfavourable, all being evidence of severe toxæmia. Relatively slow pulse rate is not necessarily favourable, though a high rate is always ominous. Development of local septic foci promises favourably, leucocytosis is usually favourable. The delirium may be intense early in the case and completely disappear, the patient becoming perfectly rational and conscious of a sense of well-being, although still intensely cyanotic and so dyspnoëic that he can hardly answer questions, in fact, this condition may go on to within a few minutes of dissolution. Broncho-pneumonia is always serious, and, judging from post mortem findings, carnification and scarring of the lungs with probably bronchiectasis will be sequelæ inevitable in a great many cases.

I have the honour, with the kind permission of Colonel H. M. Robertson, to submit this provisional report. Full statistics are being prepared, but will not be available for a considerable period.

## THE WORK OF A STATIONARY HOSPITAL IN THE FIELD

BY COLONEL S. HANFORD MCKEE, C.M.G., C.A.M.C.

*Formerly Officer Commanding a Canadian Stationary Hospital*

**M**EDICAL and surgical work, especially surgical operations, form rather a small part of the day's work in hospitals with the expeditionary forces in France, or in the East. This fact has been a great disappointment to hundreds of surgeons in the past, and I expect will be so to many in the future. It matters not whether a hospital is designated a "Casualty Clearing Depot", a "Stationary" or a "General" hospital, they are in reality all "Clearing" hospitals, admitting and evacuating patients as quickly as possible, and differ only in the matter of size.

The routine is made up of the admission of patients, classifying them, getting their bodies and clothes clean, attending to any urgent professional work, and evacuating to England and the different depots as quickly as possible. The D.M.S. is interested chiefly in empty beds; not how many major operations you are doing daily, but in how quickly you are getting rid of your cases. He often wants beds in large numbers and in a great hurry, and, I am sure, looks with more pleasure at your empty bed state than on any other return. Nor is it always possible to please him in this respect, for, during periods of heavy casualties, one is taxed to his utmost, not only to find beds but even for tent space, where these worthy men may be given cover from the cold and rain.

At No. 1 Stationary—a tent hospital in France of two hundred beds—we have had as many as five hundred and sixty-four patients, while at Lemnos, though raised to four hundred beds, the number of patients ran anywhere from eight hundred to nine hundred. A favourite trick was to get you to evacuate every possible case, say two hundred, and then send you two hundred more with a polite note regretting they were unable to take away your two hundred patients. I once protested, but was told there was a war on. I was too delighted that this information was getting about to continue the conversation.

After a number of trials, the following method of admission was found satisfactory.

The Orderly Officer of the day acted as the admitting officer.

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Read at the Medical Society of the C.A.M.C., Shorncliffe.

He generally knew an hour or two before a convoy was to arrive and usually was informed as to the number of cases, and whether they were walking or stretcher cases.

We used a large hospital marquee as the admission tent, and, after the patient had been examined by the medical officer, three clerks took down the following particulars:

No. 1, filled in A.F. 36, from which the Admission and Discharge Book, A.B. 27, was later written up.

No. 2, filled in the diet sheet, always putting in a diagnosis.

No. 3, took the particulars for a card index system, which we found a comfort and a joy.

Every mail brings one a long list of names. "Have you any trace of the following?" With the cards arranged alphabetically in a pigeon-holed box, we could look these up very quickly and with accuracy. We kept two boxes, one for patients in the hospital and one for those discharged, and on the latter a note as to their destination.

After the necessary forms were filled in, the patient was taken to an adjoining tent where he was stripped and given a bath. His clothes were quickly tied up, in an ordinary sack, and sent to the disinfecter. After his bath the patient was given clean clothing and taken to the ward. The serious stretcher cases were, of course, taken straight to the wards. By means of a slate, with the hospital ward and bed arrangement scratched upon it, the admitting officer was able to designate what bed he wished a patient sent to. In that way we were able to keep medical, surgical, serious, and special cases grouped.

Most of the convoys arrived at night with the men hungry, tired, and sleepy. I have actually seen a man so tired that he was unable to keep awake, while his arm was being set. No matter what time of night a convoy arrived, the men were always fed and given a smoke and made comfortable for the night. I must say I have never been engaged in medical work which gave such a return as looking after wounded from the front. Unless there was some definite indication for interference, the patients were left severely alone until morning.

The medical officers began their rounds at 9 a.m. and saw all their cases first with a view to making out the ward returns. After that, operations, dressings, and other ward work were in order. It was necessary to insist that all ward returns be sent in before operative work was proceeded with as the returns from the hospital had all to be sent off before noon. I won't trouble you with any details about the returns rendered. I judge they were sufficient for all purposes.



At a meeting of medical officers at Valcartier, some one asked the D.M.S. what about holding office? I have thought of the answer many times. He replied, "That is one of the beauties of active service, there is no office." But that was before the world war. Now it's all office.

Hospital cases in France are classified as follows:

- (a) Unevacuable to England within one month.
- (b) Evacuatable to England within three weeks.
- (c) Fit to return to duty within three weeks.
- (d) Fit to evacuate to convalescent depots within a few days.

The surgical work we were called upon to do, consisted mostly in giving infected areas free drainage, and the usual number of bullet and shrapnel extractions.

The most interesting cases from a clinical point of view were the trench or spring nephritis and the gas cases. We had a good many of the latter—non-septic pneumonias—who were very ill and who were treated with rare judgement by my chief medical officer, Captain Gwyn. There were also the usual number of ruptured eye-balls to attend to, and it took two mastoid operations to teach me that pain at the tip or any other part of the mastoid process was not a valuable clinical sign—not in a patient anxious to be operated upon or to be sent home to "Blighty".

Our evacuation return was sent in twice daily, at noon and at six p.m., to the embarkation medical officer. The cases for evacuation were classified:

Those for England.

Those for the venereal camp.

Those for convalescent depots or Base details.

The cases for England were classified as:

- (a) Needing a swing cot.
- (b) Needing inside cabin space.
- (c) Deck or walking cases.

In due time, we were notified, generally by telephone, at what hour the different cases would be sent for. We had nothing to do with the question of transportation. This department was admirably managed by the British Red Cross Society.

Hospitals with the Expeditionary Force have then two duties to perform:

First: To return men to duty within three weeks, or

Second: To evacuate to England as soon as possible, doing in the interval only such emergency operations and other treatment as may be required.

## AUTO-SERUM TREATMENT OF CHOREA\*

BY

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**R**ECENT researches on the bacteriology of chorea have resulted in the repeated finding of a micro-organism either in the blood or in the tissues of the central nervous system. Contrary to this a great many skilled investigators have been unable to obtain positive findings. The organism most frequently found is a coccus belonging in the general streptococcus group and very similar to the coccus originally described by Poynton and Paine. Within the past three years many positive streptococcus cultures have been obtained in cases of chorea from the teeth and tonsils, while the blood cultures have been usually negative. These septic foci have in many instances been undoubtedly the source of the infection but unfortunately their eradication of these foci has not effected a cure of the chorea.

There are a large number of observers who believe that Sydenham's chorea is essentially a manifestation of rheumatic fever and that it represents an organic disease of the brain which attacks all parts of the cortex equally and impartially. There is still some difference of opinion among those who hold this view as to whether the disturbance in the central nervous system is caused by the direct presence of bacteria or by the presence of bacterial toxins absorbed from some other part of the body.

There are many who believe that chorea is always a manifestation of infection, that rheumatic fever is the commonest infection which produces such manifestations, but that other infections may at times produce the disease. This view would explain the cases which occasionally have been observed to follow other infections, such as scarlet fever. It is interesting to note that the other diseases with which chorea has been associated are conditions in which streptococci are frequently found. Rosenow's

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\*From the Medical Clinic and Research Laboratory, Hospital for Sick Children.  
Read at the Hamilton meeting, May 30th, 1918.

observations on the transmutation of bacteria of the streptococcus pneumococcus group, and on the ability of this group of organisms to change their selective affinities from time to time are suggestive in connection with the occurrence of chorea, not only as a manifestation of rheumatic fever, but of other streptococcus infections.

On the other hand, other observers, while admitting the association of chorea and rheumatism, believe that chorea represents a functional disturbance due to a variety of causes, and amongst these causes, infection is one, and of the infections rheumatism the most common; in addition to this, however, they feel that the various factors of the hygiene and environment, which produce functional disturbance in general, may be responsible for some cases of chorea without the medium of infection. This view might possibly explain the instances in which chorea has apparently developed after a fright or mental shock.

The question of the pathological anatomy of chorea is closely connected with that of its bacteriology. The view appears to be gaining ground that chorea does not represent a functional disturbance of the central nervous system, but that it is characterized by organic lesions of the brain, which, while only temporary are none the less actually present. Loubet concludes that the lesion is a mild encephalitis caused by the toxins absorbed from an infection without the actual presence of organisms in the tissues of the nervous system. The majority of French observers appear to hold this view. Both American and European observers have noted the appearance, at autopsy, of congestion, thrombosis and peri-vascular infiltration with small cells, while Poynton and Paine have in addition noted streptococci in the pia mater as well as in the brain itself.

The relationship of chorea to syphilis has been suggested and disproved. The changes in the blood and spinal fluid have also been intensively studied but nothing of any importance has been found.

In 1912 A. L. Goodman of New York was attracted to the subject of chorea therapy when two of his cases developed classical symptoms of miliary tuberculosis and died. At autopsy it was found that the tubercles were restricted mostly to the central nervous system. It occurred to this observer that the inability to properly bring about a cure was due to the fact that all previous methods employed were ineffective in that they did not reach the seat of the trouble, which exists in the central nervous system. Being thoroughly convinced of the infectious nature of the malady

he felt that any measure directed to the central nervous system would be of great benefit.

It is not within the scope of this paper to discuss exhaustively the theoretical aspects of this treatment. There are many gaps in our knowledge, both of the pathology of chorea and of the drainage of the subarachnoid space and the ventricular system which must be filled before we can expect a very satisfactory explanation.

In view of the fact that chorea is generally recognized as a bacterial disease due to a streptococcus of the viridans group, certain antibodies must perforce be in the circulating blood plasma, which antibodies do not enter the cerebro-spinal fluid on account of the choroid plexus which does not permit the transmission of these antibodies into the spinal canal. When the serum is injected into the canal, certain chemotaxic action takes place and the walls of the choroid plexus again become permeable.

#### TECHNIQUE

It is most essential that both tuberculosis and syphilis be excluded and that all drug therapy be suspended for at least five days previous to the injection. Most serious results have been encountered when this latter point has not been adhered to. Drugs circulating in the blood plasma have a much more potent effect when injected into the spinal canal and serious results are thus obtained, particularly after the use of salicylates, when very toxic symptoms of salicylic acid poisoning have appeared.

In practically every instance the treatment was administered in the out-patient department, the patients returning home within an hour or two following the injection.

The first step consists in withdrawing about 50 c.c. of blood from the median basilic vein. In some instances an anæsthetic is necessary, as the patient is often too nervous to keep still sufficiently long to obtain the amount of blood required. Ethyl chloride is the anæsthetic employed. It is important to have the tourniquet applied just tight enough to impede the arterial flow; of course one soon empties the arm of the venous blood and no more can be obtained until the tourniquet is released. A nice plan in this connection is to use a blood pressure band on the arm and have it inflated to about two thirds the blood pressure. The blood is received into three sterile test tubes; the rubber tubing and needle having been previously sterilized and held, so that the opening in the test tube is protected from contamination, by a



piece of sterile gauze wrapped about the rubber tubing down to its point of entrance into the test tube, the gauze from there on being held about the test tube. The tubes are stoppered with sterile plugs and set aside for a few minutes to allow the blood to clot. Before putting them into the centrifuge, a sterile platinum wire is run down each tube to separate the clot from the side so as to facilitate obtaining the greatest amount of serum possible. The test tubes are then put in the centrifuge for thirty to forty minutes. At the end of that time the serum is drawn up in a sterile pipette, emptied into a sterile test tube and put in the incubator to keep at the proper temperature for injection. In our first few cases the serum was inactivated before injection. At present we are omitting this, trusting to our technique to keep the serum sterile. From 50 c.c. of blood we obtain 20 to 25 c.c. of serum. The preparation of the serum takes about one to one and a half hours. The patients come to the out-patient department about 9 a.m. and the serum is ready at 11 a.m.

The patient is prepared as for lumbar puncture. As an anæsthetic is necessary they have no breakfast. The serum is drawn into a 20 c.c. record syringe which fits the ordinary lumbar puncture needle. The patient is then anæsthetized with ethyl chloride, the needle inserted and about 20 to 25 c.c. of spinal fluid withdrawn. The record syringe is then attached and the serum slowly injected. This is the crucial step in the operation, as it is essential to give as much serum as possible without causing pressure symptoms. As one slowly injects the serum, when sufficient has been injected, one feels an obstruction to the entrance of the serum. This is very definite and tells the point at which to stop. Injecting more, after this resistance has been encountered, invariably results in marked pressure symptoms such as vomiting, severe headache, elevation of the temperature, etc. An anæsthetic is necessary to enable one to detect this sense of resistance. In our series of cases we have used an average of 17 c.c. of serum.

The patients are kept in the hospital from one to two hours to be watched for pressure or heart symptoms. They are then sent home to bed for one week, when they return to the hospital. In the interval, the public health nurses visit them to see that instructions are carried out. Usually improvement follows in two or three days and becomes stationary again by the end of the week, when another treatment is given.

Following the injection there may be a mild disturbance, such as, slight rise of temperature, a slight stiffness of the neck, increase

in pulse rate. This rapidly passes off. Nothing solid is given to eat for six to eight hours following the treatment.

#### CASE REPORTS

Case 1. G. C., male, eight years of age, admitted to medical clinic, September 8th, 1917, complaining of slight twitching of hands and face extending over a period of one year. Examination revealed numerous decayed primary teeth; tonsils were large. On same date the tonsils were removed and six defective teeth pulled, following which procedure the choreiform movements were decidedly aggravated and at the time of his first injection, September 20th, he was scarcely able to walk or hold objects in his hands.

First injection, September 20th, 20 c.c. serum intraspinaly. Second injection, October 4th, 15 c.c. serum given—no improvement. Third injection, October 18th, 10 c.c. serum given, no improvement. Fourth injection, October 22nd 19 c.c. serum given, no improvement. Fifth injection, October 25th, 17 c.c. serum given, no improvement. November 17th returned to clinic very much improved, with scarcely any twitching. When last heard from on April 18th, 1918, his general condition was excellent and there was no evidence of choreiform movements.

Case 2. E. S., female, ten years of age, admitted to medical clinic August 13th, 1917, on account of twitching of face accompanied by irregular rotatory movements of right shoulder, of two months' standing. Tonsils had been removed one year ago on account of lack of response to medicinal treatment. She was given 12 c.c. of serum intraspinaly, which was followed by more or less reaction, consisting of pain over body which persisted for eighteen hours; in one week's time she was completely cured.

Case 3. R. W., male, ten years of age, admitted to medical clinic April 16th, 1917, with a complaint of extreme nervousness associated with irregular jumpy movements of the left hand and arm which commenced four months previously. He was unable to pick up objects with the affected hand; easily stumbled and fell; in fact was so restless that his mother could not keep him in bed. The tonsils were found to be not only enlarged but diseased, and a presystolic murmur was present. On September 16th, 1917, in view of the fact that there was no response to medicinal treatment, he was given 12 c.c. of serum intraspinaly; second injection September 12th, 15 c.c. of serum; moderate reaction

consisting of vomiting; some improvement noticed. September 20th, 15 c.c. of serum injected; considerable improvement; there was no reaction. October 25th, 15 c.c. serum injected; only an occasional twitching thereafter; marked improvement. April 18th, when last seen showed an occasional twitching although the mother said he was a different child.

Case 4. H. B., female, fourteen years of age, admitted to medical clinic August 27th, 1917, exhibiting general twitchings over whole body, particularly on right side of three months' duration. Tonsils enlarged and diseased. One month previous to onset of chorea had an acute attack of tonsillitis. August 30th, 10 c.c. serum injected, vomited several times after the injection. September 13th, 13 c.c. serum injected, very slight improvement. This patient was lost track of.

Case 5. J. F., male, twelve years of age, admitted to medical clinic, August 11th, 1917, with irregular spasmodic movements and twitchings over whole body; great difficulty in walking and feeding himself, of three weeks' standing. The tonsils had been removed four years previously. August 13th, 1917, 15 c.c. serum given, considerably improved. August 20th, 15 c.c. serum injected, very little further improvement. September 6th, 15 c.c. serum injected, very much improved. September 24th, 10 c.c. serum injected; twitchings still present but steadily improving. October 22nd, 10 c.c. serum given, no twitchings present. November 28th, when last seen showed no evidence of chorea.

Case 6. M. T., female, seven years of age; admitted to medical clinic July 27th, 1917, with severe jerking movements over entire body of one week's standing, 17 c.c. serum given intraspinously; at the end of one week's time there was no evidence of chorea.

Case 7. D. R., female twelve years of age, admitted to medical Clinic May 7th, 1917, with irregular spasmodic movements of the extremities of three months' standing. Throat appears normal; a mitral systolic murmur present; has suffered several attacks of severe sore throat in the past. May 10th, 1917, 15 c.c. serum injected, slight headache; vomited several times, very marked improvement May 28th, no twitching.

Case 8. D. M., female, fifteen years of age, admitted to medical clinic July 11th, 1917, with twitching movements of all extremities and inability to talk, extending over a period of six months, previous treatments including rest and medication having made no impression on the progress of the condition; 18 c.c. serum

injected; severe reaction. This patient did not return to the clinic because of the severity of the treatment, but it was subsequently ascertained that her choreiform movements had disappeared one week following the injection. When last seen by the public health nurse November 21st, 1917, she was normal.

Case 9. C. M., female, nine years of age, admitted to medical clinic May 17th, 1917, with irregular movements of face, hands, and arms, of three weeks' duration, becoming rapidly worse. This patient was unable to feed herself and had difficulty in standing. Tonsils were removed in 1914. May 28th, 1917, 17 c.c. serum injected intraspinaly, very severe reaction, the patient continuing to vomit for one week following the injection; in spite of this, however, there was an immediate improvement and by June 28th there were no manifestations of chorea. On October 22nd, when last seen, there had been no recurrence.

Case 10. H. A., female, twelve years of age, admitted to medical clinic, April 30th, 1917, jerking movements of left arm, hand and leg; unable to speak and great difficulty in feeding herself; of three days' duration. May 10th, 1917, 15 c.c. serum injected; vomited several times; moderate reaction; some headache; slight improvement. May 21st, 1917, slightly increased movements, 15 c.c. serum injected followed by pronounced improvement; slight reaction in the form of headache. July 15th, 1917, very much improved. July 28th, 1917, 17 c.c. serum injected; movements completely disappeared.

Case 11. P. C., male, eight years of age, admitted to medical clinic, May 14th, 1917, for spasmodic movements of legs, arms and face, off and on for a period of two years. Tonsils removed three years previously. May 17th, 15 c.c. serum injected; considerable improvement. May 28th, 17 c.c. serum injected. June 11th, no sign of chorea.

Case 12. R. McD., female, eleven years of age, admitted to medical clinic, July 27th, 1917, with tremor in both hands and general weakness. Five years previously had a similar attack lasting three months, and rheumatic fever one year ago. August 2nd, 14 c.c. serum injected; slight headache; wonderful improvement. August 11th, no evidence of chorea. May 9th, 1918, was in excellent health when last seen.

Case 13. A. A., male, ten years of age, admitted to medical clinic May 23rd, 1917, with twitching of arms and legs, of a week's duration. Tonsils enlarged and diseased. On April 23rd, 15 c.c. serum injected, slightly improved. May 28th, 15 c.c. serum



injected, considerable vomiting; no improvement. June 11th, 12 c.c. serum injected. This patient refused to return on account of the severity of the treatment but a report from the private physician reveals that the child was completely cured.

Case 14. L. B., female, thirteen years of age; admitted to medical clinic, March 1st, 1917, with spasmodic movements of arms and legs, particularly on the right side; twitching of facial muscles and impairment of speech, mitral regurgitant murmur. Tonsils were removed one month previously having suffered from tonsillitis repeatedly. One intraspinal injection 15 c.c. resulted in a complete cure.

Case 15. L. P., female, thirteen years of age, admitted to medical clinic, November 21st, 1917, with twitching of head and arms, frequently dropping objects, for the last three weeks. November 1st, 10 c.c. serum injected, moderate reaction with headache; very pronounced improvement. November 8th, 11 c.c. serum injected; no reaction, cured. April 22nd, 1918, no evidence of chorea.

Case 16. F. T., male, seven years of age, admitted to medical clinic April 1st, 1918, with weakness of left side of body and jerking movements of the hand and arm, of two weeks' duration; difficulty in feeding himself. Tonsils enlarged and diseased. April 4th, 15 c.c. serum injected, condition about the same. April 11th, 21 c.c. serum injected, slightly improved. April 25th, 22 c.c. serum injected, considerably improved, reaction more pronounced. May 9th, no evidence of chorea.

Case 17. F. C., female, five years of age, admitted to medical clinic May 7th, 1917, with irregular movements of arms and legs, difficulty in feeding herself and also in walking; two weeks' duration. Tonsils slightly enlarged and inflamed. May 10th, 15 c.c. serum injected, severe headache and vomiting; considerably improved. May 21st, 15 c.c. serum injected; movements slightly increased. June 4th, 15 c.c. serum injected, very much improved; can feed herself. June 28th, 15 c.c. serum injected, all signs of chorea disappeared. May 2nd, 1918, no return of the chorea.

Case 18. P. G., female, nine years of age, admitted to medical clinic April 15th, 1918, with irregular movements of hands, arms and head; off and on for six years. April 22nd, 18 c.c. serum injected, very much improved. May 2nd, 20 c.c. serum injected. May 9th, 16 c.c. serum injected. Choreiform movements disappeared.

Case 19. W. H., female, nine years of age, admitted to

medical clinic January 3rd, 1918, with irregular twitchings of the extremities, on and off for one year; partial paralysis of the right side. Tonsils removed one year and a half ago. January 10th, 18 c.c. serum injected, slightly improved. January 17th, 20 c.c. serum injected, decided improvement. February 14th, no evidence of chorea. April 17th, no evidence of chorea, although the child has a facial tic.

Case 20. S. B., private patient, male, age eleven years, twitching of all extremities to marked degree; mitral systolic murmur present; tonsils diseased. November 23rd, 18 c.c. serum injected, mild reaction. November 27th, much improved. November 28th, 20 c.c. serum injected, marked improvement. December 7th, 24 c.c. serum injected, improving. December 15th, 24 c.c. serum injected, cured.

This patient was one of the most severe and was so bad that he could hardly walk or talk.

Case 21. E. W., private patient, nine years of age. First seen December 7th, 1917, for general twitchings, difficulty of speech and in taking food; of one month's duration. Tonsils enlarged and diseased. December 20th, 20 c.c. serum injected after which twitching almost disappeared; mild reaction. December 27th, 24 c.c. serum injected, very little evidence of chorea remaining. January 6th, 1918, 25 c.c. serum injected, choreiform movements entirely gone. When last seen in April, 1918, the child's physical condition was much improved and there was no evidence of the previous infection.

Case 22. R. K., private patient, eleven years of age, first seen June 6th, 1918, with severe twitching movements of the right side and difficulty in speech. Tonsils had been partially removed three years previously and there was evidence still of a good deal of infection remaining in the unremoved portions. June 12th, 12 c.c. serum injected, no reaction, slight improvement. June 20th, 20 c.c. serum injected, vomited for two days following this injection, after which there was a very pronounced amelioration in symptoms. July 3rd, 14 c.c. serum injected, no reaction, choreiform movements disappeared. July 17th, remainder of tonsillar tissue removed. When last seen, August 14th, 1918, his physical condition was much improved and there was no sign of chorea.

Case 23. M. E., private patient, fourteen years of age, first seen July 25th, 1918, for generalized twitching of all the extremities with slight difficulty in speech and feeding herself. The tonsils

were much enlarged and badly diseased. July 17th, 25 c.c. serum injected, vomited once, severe headache for two days, very marked improvement in the twitchings. July 28th, 22 c.c. serum injected, slight reaction, much improved. August 9th, no evidence of choreiform movements.

Of the series of twenty-three cases observed over a period of almost a year and a half, 77 per cent. were cured, 19 per cent. improved, and one case unimproved, this one having refused further treatment on account of a severe reaction. Of the cases observed over this period of time there has so far been no recurrence. In all instances, except six in which tonsils were removed, there were observed what were apparently foci of infection, which were attended to after the course of treatment.

Of the twenty-three cases, seventeen were of a mild degree and five were severe. In four instances the duration of the disease was over a year, while the remainder showed symptoms on an average of six and a half weeks' standing.

The average number of injections given were three; several were given only one injection, while in one instance five were administered before a cure was effected. The average amount of serum injected was 17 c.c. Nineteen cases were cured in three weeks and four were cured within one week. All the severe cases required more than one injection.

#### DISCUSSION

In practically every instance there had been previous medical treatment given with the usual indifferent and unsatisfactory results. In most cases there was a mild reaction in the form of vomiting and an occasional rise of temperature; on only one occasion was the reaction of such a nature as to prevent the return of the patient to the clinic and that owing to parental objection. The withdrawal of an amount of spinal fluid equal to that of serum injected did not appear to be necessary.

It occurred to us that failure to obtain satisfactory results and prompt reaction might be due to the lack of sufficient antibody production in the plasma. This, to us, seems quite within the limits of possibility taking into consideration the varying susceptibility to disease.

## RESULTS

1. Auto-serum therapy in our hands has been productive of infinitely more satisfactory results than any other form of therapy, a cure of 77 per cent. of the cases being affected within three weeks' time.

2. The technique is so simple that it may be employed in any home or out-patient department under mild anæsthesia.

3. With the observance of proper precautions the reactions are negligible.

4. There have so far been no recurrences in over a period of a year and a half, but more time is necessary in order to give a certain decision on this point.

The authors desire to express their appreciation of the co-operation of the house staff and nurses of the hospital.

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## TRINITROTOLUENE POISONING

BY HENRY ODLAND, M.D.

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THE reports on trinitrotoluene poisoning which have appeared during the past two or three years deal mainly with the clinical symptoms and findings and the prevention and treatment of the disease. Reports on the post mortem findings are very meagre, both with reference to detailed anatomic changes and the nature of the poisoning.

It is now generally conceded that absorption of the substance by the body may take place either through the skin and digestive tract, or by inhalation of the fumes, or by a combination of these methods. Trinitrotoluene has been recovered unchanged from the faeces and has also been detected in the urine.

The paucity of reports on the pathology of the disease is probably partly due to the fact that relatively few cases terminate fatally. The most comprehensive report is that of an official communication by the British Ministry of Munitions<sup>1</sup> which gives the following summary of the post-mortem findings:

"The outstanding feature is the atrophy of the liver, which in acute cases is reduced to one half the normal weight. The outer surface is smooth, reddish in colour, with slightly elevated gamboge-coloured areas of various sizes. On section in the red areas the tissue is smooth, flat, firm; the normal lobular pattern is absent, the portal systems being set very close to one another; in the elevated yellow islands the tissue is bulged and soft; an indistinct lobulation is visible, the lobules being larger than normally. Ascites is sometimes present. The bile in the gall bladder may be unusually viscid. The kidneys on section are enlarged and icteric; the cortex bulges and the labyrinths are frequently conspicuously yellow. There is considerable engorgement of the pyramids. The myocardium is pale, soft and flabby. Petechial and diffuse hæmorrhages are generally found beneath the endocardium, the

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pericardium, and the peritoneum. They have been observed on the skin, on the rib cartilages, and elsewhere in the body.

"Microscopically a great part of the liver tissue is found to have undergone complete destruction associated with a proliferation of fibrous tissue. In these areas the necrosed hepatic cells have almost entirely disappeared. The areas of complete destruction correspond to the sunken red areas seen with the naked eye. Where the destruction is not complete the histological picture is almost identical with that of the early stages of ordinary portal fibrosis. The liver tissue is traversed by fibrous trabeculae enclosing areas of degenerate, partly destroyed parenchyma; in the healthier parenchyma slight regeneration may be present. These areas of incomplete destruction correspond to the raised gamboge-coloured nodules seen with the naked eye. The kidneys show cloudy swelling and fatty degeneration in the tubules.

"The jaundice is possibly the result of obstruction, because in sections of the raised areas the bile dilated intercellular spaces have been found to be confined to the central portions of the lobules, whilst the portal bile-ducts have shown catarrhal degeneration and the portal ductules narrowing or obliteration of their lumina."

This report agrees fairly well with the observations of Spilsbury<sup>2</sup> and also the case reported by Livingstone-Learmonth and Cunningham<sup>3</sup>. H. S. Martland<sup>4</sup> reports a case without jaundice, having a severe anæmia and hæmorrhages from the mucous and serous membranes. Autopsy findings in this case were that of a severe acute aplastic anæmia. The liver which usually shows most marked changes, in this case showed only an increased iron pigmentation, and no gross or microscopic evidence of a toxic hepatitis. There was a great reduction in both white and red blood cells with little evidence of bone marrow regeneration.

Two similar cases were reported by the British Ministry of Munitions mentioned above. Both were unassociated with jaundice; one showing atrophy of the liver as in the ordinary cases, the other no gross lesions in the liver, whatever.

#### REPORT OF CASE

**HISTORY:** A male, age twenty, medical student, went to work in a Canadian munition factory about July 1st, 1916, and remained there for about eight weeks, when he became jaundiced and complained of pain in the abdomen. During that time he

was exposed to the vapours of trinitrotoluene, and was found on several occasions to have exposed himself voluntarily to the vapours of toluene.\* The jaundice gradually increased in severity, but, after six weeks' treatment in the hospital of the factory, began to fade. Patient's general condition also improved, and he felt so well that he resumed in the autumn his studies in the medical school. Suddenly, on October 18th, he began to have hæmorrhages from the nose and bowel and into the subcutaneous tissue. He came rapidly weaker, collapsed and died ten hours after admission to the Royal Victoria Hospital, and within forty-eight hours after onset of the bleeding.

Physical examination on admission to hospital revealed a young man well nourished, and athletic, but in a state of marked prostration. The conjunctival membrane showed faint icteroid tinge. On the anterior surface of the left thigh there were many small purpuric spots or ecchymoses. Axillary and inguinal glands palpable. The anterior nares blocked with blood clots. The examination of the lungs was negative except at both bases, behind, where many medium-sized râles were heard, at the end of inspiration. Accentuation of the apical heart sounds as well as of the pulmonary second. Blood pressure, 110-60. White blood cells, 1,600. The abdomen was rounded, and there was a slight diffuse tenderness over the epigastrium. Liver dulness extended from the sixth rib in the mid-clavicular line to 3 cm. above the costal border. There was practical anuria, and on catheterization 5 c.c. of bloody urine were obtained. Patient was admitted during the night and died the following morning.

Autopsy, fourteen hours post mortem. Anatomic diagnosis: hæmorrhagic necrosis of the liver, degenerative nephritis, hæmorrhages into pelvis of kidney, ureters, pericardium, intestines and skin; œdema and enlargement of the lymph glands.

The body is that of a white male 170 cm. long of good physique and nutrition. No definite jaundice. On the thighs are numerous subcutaneous hæmorrhages or ecchymoses, the largest 1 cm. in diameter. The nostrils are filled with clotted blood, chest well formed, upper and lower limbs very muscular. On opening the abdomen the liver is just visible below the costal margin and 5 cm. below the ensiform cartilage in the midline. The dome of the diaphragm is at the level of the fourth rib right and fourth space

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\*The vapours of toluene seem, according to the information of the physician at the factory, to possess intoxicating or exhilarating qualities.

left. There is a small amount of bloody fluid in both flanks. The heart weighs 300 gms., visceral pericardium shows small areas of ecchymoses; the heart muscle is pale in colour, quite firm and contains a few dark hæmorrhagic spots beneath the pericardium. The lungs are voluminous, mottled pink in colour, and there is marked crepitation. On section the surface is bright red, congested and dry; the bronchi are clear. Beneath the serosa of the intestinal loops are numerous irregular, large ecchymoses, and throughout the large and small intestines numerous small to large hæmorrhagic infarctions or ecchymoses are seen beneath the mucosa.

**LIVER:** Weighs 1,760 gms. and measures 25 x 16.5 cm. The surface is generally smooth, bluish, and the capsule not thickened, but there are definite irregular, hæmorrhagic depressions which are partly streaky and partly patchy, and evidently correspond to collapsed areas. These are prominent over the right lobe. The left lobe is relatively small, flat, and smooth. On section the surface presents a very characteristic and unusual appearance. The whole left lobe is deeply and diffusely reddened, flat, and its vessels prominent. The liver tissue is collapsed, and markings are obliterated. The whole right lobe on the other hand, is generally pale gray, and shows tremendous parenchymatous swelling, which puts the lobular markings around depressed blood vessels into a definite relief network. Parts of the right lobe show extension of hæmorrhagic, depressed collapsed areas from the left lobe into its raised, swollen parenchyma. The blood vessels of the right lobe are injected, but bile ducts are not prominent, and the tissue is not visibly jaundiced. The termination of the parenchymatous swelling in the right lobe is rather abrupt towards the left, and only a few bas-reliefs extend from the right into the left lobe, where they also terminate abruptly within the collapsed hæmorrhagic tissue. The gall bladder is filled with light brown fluid. The pancreas weighs 15 gms. and measures 17 cm. in length. It is rounded and flabby and dark in colour. On section, normal markings are indistinct. The spleen weighs 240 gms. The surface is smooth and dark red in colour. The cut surface is dark red, flabby and friable; the normal markings are indistinct. The mesenteric and retroperitoneal glands are enlarged and dark bluish in colour. There are palpable glands in the epitroclear, axillary, and inguinal regions. The kidneys: The right organ is of usual size and shape, but appears darker than normal. The capsule strips easily and the surface is smooth. The cut edges bulge. The differentiation between the cortex and the medulla is poor. The pelvis is



distended and contains a large amount of dark clotted blood. The left kidney is similar in all respects to the right. The ureters are distended and also filled with clotted blood, completely obliterating the lumen. The bladder contains bloody fluid.

### *Histology*

**LIVER:** In sections it is quite easy to differentiate between the diffuse hæmorrhagic areas and the swollen, paler portions. The hæmorrhagic areas show complete collapse and obliteration of the liver tissue. Lobular arrangement can only be determined by the markedly dilated central veins and the peripheral, interlobular structures. The whole lobule is replaced by red blood cells, blood and bile (?) pigment, nuclear remains and indefinite fibrils. This hæmorrhagic necrosis occupies the entire centre of the lobule and extends a variable distance to the periphery. As one approaches the interlobular spaces an infiltration by lymphoid and plasma cells becomes prominent and follows, more or less definitely, the course of the interlobular structures. Within these lymphoid cell infiltrations bile ducts are prominent.

The vessels of the interlobular tissue are dilated, and their perivascular spaces show similar cell infiltration. The portal bile ducts appear intact.

The picture of the swollen pale areas is as follows:

Around the central vein which is markedly dilated occurs irregular streaky necrosis which leads to destruction of the liver cells, leaving only blood capillaries and a fibrillar reticulum. These necroses are generally pale, and what blood appears in them is evidently still within vessels. They extend in streaks from the central vein to the interlobular spaces where they meet similar periportal, necrotic areas containing cellular remains. These periportal necroses show occasionally some lymphoid cell infiltration, but this, in this instance, is limited and frequently quite absent, and bile ducts are not conspicuous. Between these intercommunicating central and peripheral streaks and necroses rest bands and areas of liver cells, occasionally still in columns and containing fading red blood cells. The liver cells themselves are swollen, oedematous, often multinucleated, again atrophic and necrotic, a condition which seems to lead to gradually increasing separation of these cells. There is remarkable absence of fat, either in the form of intercellular infiltration or in the form of fatty cell disorganization.

It is interesting to note that these liver cells, although swollen and cedematous, do not show the general features of parenchymatous degeneration and necrosis, but rather a cytolysis incident to cedematous swelling and solution of cells, which reminds one much of the pictures seen in the cytolytic necrosis of liver cells in advanced venous stasis, fully described by Oertel (*Archives of Int. Med.*, 1910, vi, 293 and *Berliner Klin. Wochenschrift*, 1912, xli, 2019), and Symmers (*Jour. Exp. Med.*, vol. ix, 1907).

To recapitulate, then: The flat, red areas mostly conspicuous in the left lobe of the liver correspond to hæmorrhagic necroses with marked lymphoid cell infiltration from the interlobular periphery; the pale areas, constituting most of the right lobe of the liver, in which the parenchyma appears in relief, consist of intercommunicating central and peripheral pale necroses, which surround swollen and disorganizing liver columns. In these, hæmorrhages are almost absent, and portal, lymphoid infiltration is also much less marked.

A consideration of these findings in the liver points at first to a similarity with acute yellow atrophy and toxic lesions produced by certain poisons: central and peripheral necroses in lobules with swelling of the remaining liver cells, collapse of liver tissue leading to extensive hæmorrhages and gradually increasing lymphoid cell infiltration carrying many bile ducts from the interlobular septa—are changes similar to those in early and later stages of acute yellow atrophy. Closer investigation, however, shows many points of characteristic difference which stamp the lesion essentially different in genesis and histological features.

There does not seem much doubt that the paler portions represent earlier stages of this process; in them the necroses is limited, bands of liver cells and lobular arrangement are still preserved; hæmorrhages have not yet occurred, and perilobular lymphoid cell infiltration is absent or very limited.

These apparently earlier lesions display, as will be seen from the foregoing histological description, striking points of difference from those of acute yellow atrophy.

1. Cell death is not represented by coagulation necrosis which follows in the track of marked parenchymatous degeneration; (characteristic of toxins primarily attacking parenchyma cells), but seems to be mainly due to cedematous swelling and solution of cells. Thus there remains even in necrosed areas a plain fibrillar reticulum, and the cells at the periphery of these necroses are, although swollen and separated by cedema, unusually well

preserved in protoplasm and nuclei, a condition which almost immediately attracts attention and sharply accentuates the necrotic areas from the surrounding liver cells.

2. Remarkable absence of fat in the necroses or even at their periphery. Herein lies a most striking point of difference between yellow atrophy, certain other parenchyma poisons such as phosphorous and nutritive disturbances,—and this case.

Intimately connected with, and probably dependent upon, these two points is:

3. The general absence of bile stasis, bile thrombi, bile pigmentation and cholangitis in the early stages, and the presence of only limited bile precipitation even in the older hæmorrhagic zones.

4. The tremendous amount of interstitial cedema and widening of capillaries which, as far as can be determined, represents the earliest change, and seems to inaugurate the cytolytic necrosis which follows closely the vascular portal distribution.

If we take these points into consideration, we note them not only as points of difference between this lesion and acute yellow atrophy or other toxic disintegrations, but more especially as throwing light on the genesis of this disease and the toxic affinity of trinitrotoluene.

For from these findings it appears probable that trinitrotoluene is essentially and primarily a vascular poison (endothelial toxin) which injures the capillary cells and lymphatics and thus leads to massive cedema, which in turn is followed by cytolytic necroses following in the paths of this circulatory disturbance. The process leads sooner or later to collapse of liver lobules, extensive hæmorrhagic displacement, and later, as in other toxic liver destructions, to inflammatory interlobular cell infiltrations.

The supposition of the vascular character of trinitrotoluene poisoning is strengthened by the massive hæmorrhages in other organs.

Whether this condition, which is acutely and subacutely displayed in the liver, may also follow a more chronic course in which the anatomical expression more closely resembles subacute atrophies and liver cirrhosis, seems possible, but must be determined by future anatomical observations.

**SPLEEN:** There is a tremendous amount of blood and blood pigment in the pulp, with loss of pulp tissue. The Malpighian corpuscles are relatively prominent. The whole organ is swollen

and œdematous, and the sinuses are engorged with blood and pigmented cells.

**INTESTINE:** Sections of hæmorrhagic areas show marked œdematous swelling extending throughout all the coats, more especially in the submucosa. In it the blood vessels are filled with numerous thrombi, which give it an infarcted appearance. The mucosa overlying these areas is necrotic and shows some cell infiltration, but the muscular and peritoneal layers are intact. Enlarged lymph glands from adjoining mesentery shows œdematous swelling, with marked dilatation and catarrh of the lymph sinuses.

**KIDNEY:** The whole substance shows marked œdema and swelling which is especially pronounced in the interstitial tissues. The glomeruli are prominent and the capillary tufts engorged with blood, almost completely filling the capsule. In others the capillary loops appear fused, and the tuft plump and œdematous. The epithelium of the convoluted tabules is everywhere swollen and granular and in many places complete necrosis has occurred, leaving necrotic clumps in the lumen of the tubules. These changes are more or less limited to the convoluted tubules, while Henle's loops and collecting tubules show generally well preserved epithelium. The œdematous interlobular spaces show pinkish, widely separated fibrillæ and remnants of red blood cells, many of which are seen only in outline. In places the intertubular capillaries are engorged with blood.

The histological picture in the kidney seems to indicate that the cells of the convoluted tubules are at least equally involved with the vascular injury, for there the changes are quite characteristically those of parenchymatous degeneration and coagulation necrosis, thus differing from the parenchymatous disintegration in the liver. Whether this difference is due to a selective activity of the poison upon the cells of the convoluted tubules, or to the excretory activity of these cells, which would bring them into more direct contact with the poison or its products, as the result of its interference with body metabolism, must be left at present an open question.

The striking feature in this case is the abrupt and sudden fatal termination after the jaundice and other symptoms had subsided. The apparent fulminating character of the intoxication in this case therefore, probably exemplifies the true nature of the poisoning and gives a clearer picture of its genesis than some other reported cases in which atrophy of the liver was an outstanding feature. The cases which show atrophy of the liver associated with



fatty degeneration and fibrosis may be due to a more chronic and less violent intoxication.

I take this opportunity of extending my thanks to Professor Oertel for his assistance and the privilege of reporting this case.

1. "Trinitrotoluene Poisoning, officially communicated by the Ministry of Munitions," *Lancet*, London, 1916, 2, 1026.
  2. SPILSBURY, B. H.—"Toxic Hepatitis," *Lancet*, London, 1916, 1, 999.
  3. LIVINGSTONE-LEARMONTH, and CUNNINGHAM, "Effects of T.N.T. on Women Workers," *Lancet*, London, 1916, 2, 261.
  4. MARTLAND, H. S.—"T.N.T. Poisoning," *Jour. A. M. A.*, March 17th, 1917, vol. lxviii.
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A VERY important address was recently delivered by the Hon. W. F. Roberts to the Women's Institutes of New Brunswick. The address outlined the organization of the Department of Health recently established by the Provincial Government. The Women's Institutes represent almost all habitable territory within the province, and its numerous societies constitute a most important medium for the dissemination of knowledge and information for the well being and health of the people. It was on the occasion of its sixth annual convention that Dr. Roberts addressed the meeting. The point emphasized by the speaker was the medical inspection of schools and its effect upon future citizenship.

## Editorial

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### PHYSIOLOGY AT THE BED-SIDE

**D**URING the past three generations pathology has gradually become a full partner of clinical medicine. Particularly is this the case in so far as the changes of structure and of growth, and the morbid processes producing them bear on disease. Chemistry also is at the present time gradually raising itself to its proper sphere of influence on clinical medicine. But physiology! where does it appear as a concrete aid to disease? Remembered in a hazy way as dealing with abstract functions, it has been neglected in the outlook of clinical medicine. True, a large number of abnormal conditions are called "functional". There are "functional" disorders of the circulation, nervous system, respiration, digestion, etc. They are considered to be independent of gross morphological change and therefore acquire a peculiar unimportance and are slurred over quickly. Through time these conditions have acquired a position of studied neglect which is really an acknowledgement of ignorance. It is easier for clinical medicine to give them a mysterious cognomen than to frankly own to their mystery.

What physiology says this generation, medicine adopts the next! This is not so much through ignorance or neglect as it is through lack of opportunity. Occasionally a clinician arises who adopts physiological methods in the study of the patient. In consequence an epoch in clinical medicine is established. Such an epoch has taken place during the past twenty years, which has placed the understanding of cardiac function in an entirely new light.

The fault is not altogether on the part of clinical medicine. The vast amount of physiological teaching and re-

search has been done upon the lower animals and even in many cases upon the isolated parts thereof. The direct application to the human organism of this teaching and research is very often obscure. It appears as if the physiologist does not consider his science applicable to the elucidation of concrete disorders of the human mechanism. Even medical students who are fresh from their physiological training seem confused as to how to apply their recently acquired facts to the medical problems before them.

A closer and more general co-operation between clinical medicine and physiology would be of great value to both of them. The physiologist would then be in a better position to appreciate the difficulties and obscurities of many of the common processes of disease. It would also give him an intimate knowledge of many physiological problems as yet unsolved. On the other hand the unique laboratory experience of the physiologist would smooth many of the everyday ruts impeding the advance of clinical medicine. The early disorders of function, which oftentimes precede the gross structural changes, might be recognized by him. Thus means could be adopted to control the condition before it had progressed beyond repair. Future clinical medicine must advance so that it will eventually be able to recognize the earliest manifestations of disease. In order to obtain this objective it must commandeer the assistance of chemistry and physiology.

Pathology and bacteriology have proved beyond dispute the necessity of the close co-ordination of their laboratories with the wards of the hospital. Chemistry has set its stamp plainly upon clinical work and as each year passes affords greater and greater proof of the value of its help in the early interpretation and recognition of morbid processes. The time has now arrived for physiology to claim its heritage in the laboratories of the hospital. The close association of the physiological laboratory with the wards will produce undoubtedly work and results little if at all secondary to that already accomplished by pathology and chemistry.

## A NATIONAL RESERVE ORGANIZATION FOR CIVIC EMERGENCIES

A RESERVE organization, which can be mobilized in times of emergency, is one of the most striking lessons to be learned from the recent epidemic. Now that the relief bodies gradually disband, the advisability of a permanent relief unit is receiving wide consideration. It is proposed that the Canadian Red Cross in the near future extend its work to include civilian relief in emergencies of the type of the Halifax disaster, or any public event of a nature demanding immediate and substantial assistance. Local branches could be established throughout the larger Canadian cities all combined in a national association directed by a paid permanent secretary. Every city should be divided into districts, with suitable provision for headquarters at a moment's notice. In this way, should a catastrophe strike several districts, one section of the city would be able to operate emergency service. Mr. Falk, the director of the Social Service department at McGill University, has given many valuable suggestions on the subject, and observes that the first twenty-four hours following a civic catastrophe are the most precious for saving life and property. He urges the formation of local committees so thoroughly organized that every unit should clearly understand its duties in case of civic calamity, and be able to act with speed and efficiency. He advocates a nation wide organization on a civilian basis, and believes that the Canadian Red Cross would receive splendid support if it undertakes to extend its field.

The United States Public Health Service is already tackling the problem. It makes clear from the outset that it desires to aid and not supplant state and local health authorities in their work. It has issued instructions that all requests for medical, nursing, or any other emergency aid should come to the United States Public Health Service



only through the State health officer. In some cases the executive of the State board of health has been given appointment in the United States Public Health Service to act as field director. While the epidemic is subsiding along the Atlantic seaboard it is becoming prevalent in other states, and, in view of serious emergency demands, the Public Health Service issues a statement that physicians and nurses will still be needed. The latter were requested to apply to their local Red Cross chapter for enrollment and assignment to duty. Physicians who wished to undertake service in the State's Public Health Service were directed to communicate with the bureau representative in their respective states. In this way all available service was promptly requisitioned. Unquestionably all these powerful activities in both countries should and will centralize in a national reserve organization for civic emergencies. In this enterprise it is up to Canada not to follow the neighbouring Republic, but to march hand in hand.

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Six distinguished surgeons of England, France and Italy have made a recent tour of the United States, and gave addresses on recent advances in war surgery at the College of Physicians and Surgeons, New York. Major George Grey Turner, of the hospital of Newcastle-on-Tyne and a veteran of Britain's Mesopotamian campaign, described the great strides made in the treatment of open wounds, and Colonel George Gask, D.S.O., consulting surgeon of the Fourth British Army, told of the modern treatment of fractures. He expressed the hope that, after the war, the world's medical men would arrange for a more intimate interchange of opinion and knowledge.

Lieutenant-Colonel Raff  le Bastianelli, of the Italian army, described new methods of treating cerebral wounds by which, he said, 52 per cent. were saved. Majors Pierre Duval and Adrien Piolet, of the French army, illustrated

with lantern slides the extraordinary rapidity with which wounds heal under modern surgical treatment.

Sir Thomas Myles, former president of the College of Surgeons of Ireland, gave important information on the recurrence of infection and disability months after patients had been discharged as cured, and stated that infections were often more serious in casualties generally regarded as of little importance.

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It has been decided by the Congress of the United States that a drastic anti-narcotic law must be enforced to check the habitual use of morphine, cocaine, heroin and preparations containing other narcotic drugs. The drug habit had increased to such an alarming extent that, a special treasury investigating committee having been appointed, a partial report on the number of drug addicts actually under physician's treatment has been made. It is estimated that at least 1,500,000 persons in the United States are drug addicts, of whom 1,000,000 are known as such in their communities, and the balance are secret drug users. Full reports are expected to show 200,000 users within the former draft ages of twenty-one and thirty-one in New York alone. In New York City 8,000 have already been tabulated. The investigation also showed that thousands of drafted men have been dismissed from military camps after it was found they were drug addicts, and that this number included many who systematically developed the habit after being drafted, in order to insure dismissal. This condition is one reason given for the urgency of immediate remedial legislation.

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OPEN air treatment of influenza-pneumonia cases has been widely advocated and has been put into practice in Boston in a very efficient way. The State board of health sent out a letter saying that it was so firmly convinced of the

efficiency of the sunshine and open air treatment of influenza-pneumonia cases that it was making use of the press to get quick action in placing the information before city officials. The first effect noticed of this, the so-called Brook's treatment, was that the nurses and doctors did not take the disease. Before this method was adopted the hospitals were all crippled; in one hospital 100 per cent. of the medical and nursing staff succumbed. The patients are put in tents or wooden shacks, and are so placed that sunlight can fall directly on them at some time during each clear day. Air can blow freely over the patient. The expense of tents has made it necessary to use wooden shacks so built that air and sunshine can have free access to the patients, who are kept warm and comfortable, and when put in the fresh air their high fever falls.

## The Association

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### THE QUEBEC MEETING

**T**HE fiftieth annual meeting of the Association will be held in the city of Quebec in June of this year. The exact dates have not yet been chosen, but it is likely that it will take place in the latter part of the third week.

The officers for the meeting are Dr. S. G. Grondin, President-elect, and Dr. A. Vallée, Local Secretary. All the committees have been formed under well-known local men and already much valuable work has been done. It is the intention to try and induce two or more prominent men from overseas to give the addresses in medicine and surgery. The programme of the sections will be largely provided, we hope, by members of our Association, and just here may we request our members to give to the President and his Committee their heartiest co-operation, not only by making this a notable meeting in point of attendance, but also by assisting him in every way to provide a good scientific programme. We hope that the response to letters which will soon go out asking for papers will be a hearty one. It has been the aim of the officers of the Association in the past to secure as many Canadian papers as possible, but we must confess, in the light of experience, that our members have frequently disappointed us, and in order to fill out the programme it has been necessary to go beyond the borders of Canada.

We are sorry to have to state that there will be no special railway rates this year, the reasons assigned by the Passenger Association being conditions brought about by the War, including the abnormal demand on transportation and equipment. This, however, we hope, will not deter our members from attending in large numbers.

The meeting in many respects will be an historical one. It is the fiftieth meeting of the Association since its formation in 1867, two meetings having been missed in 1915 and 1916 owing to the War. The first meeting was held in Quebec just fifty-two years ago, and it seems most fitting that on this, our fiftieth anniversary, we should find ourselves back again in the ancient city.

In the name of the President and his Committee, we can assure our members of a hearty welcome and a profitable meeting.





THE CANADIAN MEDICAL



DR. NORMAN H. BEAL, 1882-1918

Associate Professor of Surgery, Western University Medical School

## Obituary

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### DR. NORMAN H. BEAL

DR. NORMAN H. BEAL, Associate Professor of Surgery at the Western University Medical School, London, Ontario, died at the Mayo Clinic, Rochester, Minn., on October 27th, 1918, from influenza pneumonia at the age of thirty-six. He had barely entered into an arrangement with the Mayo Clinic to become first assistant to Dr. W. J. Mayo in his operative work, when he was seized with this fatal malady.

He graduated from the Western University as Gold Medallist in 1906. After serving a year's internship at Victoria Hospital he spent some time in post-graduate work in the British hospitals. On his return he began practice in London, Ontario, attaching himself as assistant to the chairs of histology and pathology. In 1910 he began teaching in the department of surgery and surgical anatomy. His natural gifts and ceaseless energy made him one of the most popular and instructive surgical teachers in the department. He had taken an active part in the Canadian and Ontario Medical Associations, being a member of the executive of the latter at the time of his death. He was the moving spirit in the establishment of two live medical societies, namely, the Journal Club and the Western Ontario Academy of Medicine.

He had a brilliant future as a surgeon. His attitude towards his surgical problems was that of a research student. He devised an instrument and method of suprapubic bladder drainage which is doubtless the simplest and most efficient known to surgeons. His article on "Abdominal Surgery and Pulmonary Tuberculosis" (CANADIAN MEDICAL ASSOCIATION JOURNAL, July, 1918), is regarded by surgeons as pioneer work. He is probably the first Canadian surgeon who successfully transfused with blood, before operation, a ruptured ectopic pregnancy. His publications were not numerous but of such merit as to lead to his appointment as an assistant to the Mayo Surgical Clinics.

He had literary and musical tastes, took an active part in the University Literary Society, and was a moving spirit in

the formation of the Musical Art Society. The success of the Child Welfare movement was due in no small measure to his enthusiastic support.

In 1908 he was married to Miss Marian Louise Escott and he leaves a widow and two children to mourn his loss. Our profession lost by his death one with a most brilliant surgical future; the University Alumni lost a loveable companion and a true friend.

#### DR. A. ORR HASTINGS

DR. A. ORR HASTINGS, one of Toronto's leading medical practitioners, and brother of Dr. C. J. O. Hastings, M.O.H., died at his home in the city on November 21st. He lost his wife more than a year ago and the grief and loneliness following her death caused his decline. He practically retired after her death and gradually succumbed to nervous depression.

The late Dr. Hastings was an early graduate of the Toronto University, and finished his course in Europe. He was a post graduate of London and Dublin Universities. In 1886 he returned to Canada. He established a very large practice in Toronto and for thirty years was a familiar figure in his native city, and was universally beloved. He was in his sixty-fourth year.

#### DR. T. H. BALFE

It was with very great regret that Hamilton received the announcement of the death of Thomas Hugh Balfe, M.D., C.M., one of its most prominent medical practitioners. He was born in Smith's Falls, Ontario, forty-seven years ago. He graduated with distinction at Queen's, Kingston, and, after passing in Arts, he took up Medicine and obtained the degree of M.D., C.M., subsequently taking a post graduate course. Going to Hamilton he at once established a practice in which he became highly successful.

Dr. Balfe had been ailing for several months, and two or three times during the past summer went away for short rests. Recently he had been unusually busy in his practice, and in his weakened condition was unable to withstand the pneumonia that followed an attack of influenza. He leaves a widow and a family of five; one, a son, Thomas, has adopted his father's profession and is attending the Medical School at Toronto University. The death of Dr. Balfe robs Hamilton of one of its sound medical minds.



## DR. JAMES F. BOYLE

ONE of the sad echoes of the great epidemic of influenza which has been sweeping the West reached Toronto lately in the news of the death of Dr. J. F. Boyle. He was a comparatively young man in the prime of life, a son of the late Dr. David Boyle, who for many years was superintendent of the Ontario Museum in Toronto. In 1896 Dr. J. F. Boyle received his degree of M.B. from the University of Toronto. When the south African War broke out, shortly after, he served on one of the British transports, and at the end of the war took up post graduate work, receiving degrees at the Universities of Edinburgh and Glasgow. On his return to Canada he practised for five years in Priceville, Ontario, and since then for eleven years in Edmonton, where his public spirit in the affairs of the city and his disinterestedness and devotion to his duties as a physician, have won him a noble reputation and many friends. Dr. Boyle was an exemplar of the finest traditions of the profession; he fought the epidemic in Edmonton heedless of personal consequences; for weeks he worked among his patients night and day, and when finally attacked by influenza his resistance was so weakened, owing to his wornout condition, that he died. He, too, has paid the supreme sacrifice.

DR. JAMES LYND, formerly of Albert County, New Brunswick, died recently at Ann Arbor, of Spanish influenza. He conducted a private hospital there for some years, but recently offered himself for army medical work. Before he could be accepted he was struck down with the prevalent disease. He was a familiar figure in his native county and his untimely death has caused general regret.

DR. AMOS F. BAUMAN died at Waterloo, November 25th. He was a well-known physician of that town having held an extensive practice there for thirty-three years; for the last ten years he was also the medical health officer. He died after an illness of a year's duration, suffering from heart failure. He leaves a widow and one son. He was a graduate of Trinity University.

DR. J. C. McCABE, one of Hamilton's best known physicians, died recently after a lengthy illness. He had resided for thirty-four years in the city and built up an extensive practice.

It is with deep regret we record the names of the following

doctors who succumbed to Spanish influenza during the late epidemic; death was frequently caused by devotion to duty.

Dr. W. C. Senerton, Vancouver; Dr. E. K. Henderson, Haliburton, and Dr. James Henderson, Toronto, (brothers); Dr. John Butterwick, Calgary; Dr. Auguste Mathieu, Montreal; Dr. Pierre Lagueux, Levis; Dr. J. L. Barry, Humboldt, Saskatchewan.

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## Correspondence

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KINGSTON, ONTARIO, *November 24th*, 1918

To The Editor,

CANADIAN MEDICAL ASSOCIATION JOURNAL,  
Montreal,

Sir:—I have just seen Lieutenant-Colonel Biggar's letter in the November number of the JOURNAL, commenting on my article on "The returned soldier," in the September issue. Apparently this officer has not carefully read the portion of the article dealing with matters affecting the Board of Pensions Commissioners for I nowhere question that "pensions are awarded for disabilities or losses of normal abilities, and not for the injuries or diseases which have caused such loss"; nor that the descriptions upon which pensions are awarded should be stated in clear and un-mistakeable language.

The position I took in this article shortly was this: With the guidance of the "Instructions and table of disabilities" issued by the Board of Pensions Commissioners, the members of the Medical Boards who examine the man, and in his presence write the description of his disability, are in a better position to estimate the percentage of disability than are the medical officers of the Pensions Board, who see the written description, but not the man.

The Pensions Board, in the circular quoted in the September issue, take the opposite ground. No one questions the need of sharp supervision of the Medical Board's estimate of disability, and the right to insist that the description should qualify for the percentage estimate given.

I thoroughly believe the Pensions Board are endeavouring to do justice to the returned soldier, but I think this could be better effected by adoption of the position I advocate.

Yours very truly,

W. T. CONNELL

## Miscellany

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### News

#### MARITIME PROVINCES

By the new Health Act of New Brunswick, which has just been proclaimed by the Lieutenant-Governor, the Hon. Dr. Roberts becomes Minister of Health and Dr. G. C. Melvin chief medical officer. Dr. Abramson is chief of laboratories. The province is divided into three districts, each under a medical officer. The eastern district under Dr. F. J. Desmond; the southern district under Dr. J. F. L. Brown, and the western district under Dr. J. D. Lawson. There is also a further sub-division. Each county in a district will be a sub-district, with its own board of health, appointed partly by the municipality and partly by the government. The boards of St. John, York, and Westmorland will each have five members, each of the other counties will have three. In all cases, except in the city of St. John, the district medical officer will be a member of the sub-district boards, and chairman of all except St. John. These sub-districts deal with three services: public health and sanitation, medical inspection of schools, and vital statistics. Collectors of the latter will be appointed and, to save expense, these may also be health and sanitary inspectors. The organization will be completed by the addition of a child welfare department.

THE St. John Board of Health recently submitted a statement of the cost of the smallpox situation a year ago. The sum expended was \$14,100.76. This included vaccinations and the care of naval and military patients, as well as the boarding and nursing patients at the Isolation Hospital.

In response to an emergency cable, 10,000 dressings of sphagnum moss were dispatched from St. John for shipment overseas. The cable called for 50,000, and the ladies of St. John in connection with this branch of Red Cross work immediately responded.

DALHOUSIE UNIVERSITY, after having been closed for a month

on account of the outbreak of influenza in Nova Scotia, was reopened on November 7th. It was then found that the total entry into the Faculty of Medicine was one hundred and seven. The numbers in the Dental Faculty are also very high this year.

A LARGE new military hospital is to be constructed at Sydney; the government, while ready to stand the cost of the hospital itself, desires the city to provide the site. Major Freeman O'Neil, who has lately returned from Ottawa, appeared before the city council with the proposition. All were unanimously in favour of it, and a committee was appointed to co-operate with the government and place matters on a working basis as soon as possible. The annual meeting of the Sydney Anti-tuberculosis Society took place in October. A hundred cases were reported to have been treated by this society and a large number of incipient cases cured. The Hamilton Hospital annual grant was renewed by the town council of North Sydney after some discussion to withdraw it had been heard.

THE new Dalton Sanatorium established at Prince Edward Island is nearing completion, and is considered one of the finest convalescent homes in Canada. It will be devoted to the care of invalid soldiers.

### QUEBEC

THE results of the Medical Council of Canada examinations, which were held at McGill University, the Royal Victoria and Notre Dame Hospitals, Montreal, have been announced from Ottawa. Nine men become duly licensed medical practitioners. The examination carries with it registration on the Canada Medical Register, with the diploma L.M.C.C., which is a qualification accepted by all the provinces as sufficient for license and registration without further examination of any kind.

THE Montreal board of health has created a special bureau of Child Hygiene. The energies of the bureau will be devoted to reducing the infant death rate. Analysis of the deaths caused by influenza, pneumonia, and broncho-pneumonia during the month of October showed that the percentage of children who died from these diseases was 22.32 of the total. The total deaths for October were 1,090 for children under five years of age.



At the annual meeting of the Leeds and Grenville Medical Society, the officers elected for the ensuing year were: president, Dr. Featherston, Prescott; vice-president, Dr. Storey, Kemptville; secretary-treasurer, Dr. Kydd, Eastern Hospital, Brockville; executive committee, Dr. Sinclair, Gananoque; Dr. Kerfoot, Prescott; Dr. Robertson, Brockville; Dr. Hamilton, Westport. Very interesting papers were read and one by Dr. Wallace entitled, "Surgical Operations on the Insane and Border Line Cases", attracted marked attention, and in the discussion which followed several points of absorbing interest were developed.

APPOINTMENTS have been made by the Government to the Board of Railway Commissioners for Canada, due to the expiration of the ten-year terms of office of Dr. S. J. McLean and D. Scott. Dr. McLean has been reappointed and Dr. G. J. Rutherford, of Calgary, has been selected to succeed Mr. Scott.

ST. LUKE'S HOSPITAL has lost the services of A. J. Mulvanny, who is considered by medical authorities to be one of the ablest radiologists in Canada. In this capacity he joined the Canadian expeditionary force to Siberia. Before coming to St. Luke's about six months ago he was in Boston for ten years, serving as radiologist at the Massachusetts General Hospital and the Children's Hospital of Boston.

## ONTARIO

THE Government of Ontario appointed December 4th for the hearing of depositions from the various bodies interested in the recommendations made by the Commissioner of Medical Education in Ontario, so far as these relate to the classes of persons to be entitled to practice medicine in Ontario, and the definition of "the practice of medicine". Matters affecting the organization and powers of the Medical Council and the recommendations of the Commissioner with regard to optometrists and nurses will be dealt with later. A deputation representative of the dental profession in Ontario interviewed the Hon. Dr. Cody and advanced the generous proposition that if the government will undertake the provision of systemic dental inspection in the provincial public schools, more particularly in the rural districts, the profession stands ready to establish dental clinics in connection with the local hospitals and therein provide free dental attention for children

whose parents may find themselves unable to pay the usual expenses. The Hon. Dr. Cody replied that the importance and practical character of the proposition was fully appreciated, the Department having this identical matter under its consideration already. The only difficulty suggesting itself was one of financing, and this phase of the matter would obtain the early attention of the administration.

ONE of the important measures to come before the Ontario Legislature will be a medical bill. Several months ago Judge Hodgins presented a report on this subject, after an exhaustive inquiry, and he made certain recommendations upon which the new Act should be based. Sir William Hearst intimated that such a bill is to be introduced and it is hoped to have it become law at the next session. A good deal of debate is anticipated, as there will be strong opposition in certain quarters to some of the proposals for the regulation of the profession.

THE University of Toronto, Faculty of Medicine, has closed this year with a record first year, 255 students having registered for first year work, of whom over thirty are women.

THE Central Ontario Hospital Association has finally materialized; eight hospitals are represented: Port Hope, Ross Memorial, Lindsay, Bowmanville, Oshawa, Cobourg, Peterborough and Belleville. They were represented by the presidents of their respective boards and the lady superintendents. Mr. John D. Hayden, president of the Cobourg Hospital Board, was elected president of the Association and Dr. Henry of Oshawa, secretary.

PRESIDENT E. E. BRAITHWAITE, of the Western University, has recently called the attention of the board of governors to the necessity of the erection of a new medical school. Fifty new students have been enrolled which brings the total attendance up to about one hundred. This will necessitate the doubling of classes.

MR. J. A. McLARTY of the fifth year, and Mr. C. W. Ironside of the third year of the Western University Medical School, died from pneumonia during the recent epidemic of influenza.

ONE of the most recent organizations formed for aiding the

suffering is the "Sisters of Service". It was inaugurated on Thanksgiving Day, in the Provincial Parliament Buildings, Toronto. Branches are forming all over Ontario. The Provincial Secretary is its president and the Provincial Health Officer chairman of its executive. The primary purpose of its formation was designed to fight the disease of Spanish influenza during the recent epidemic, but it is to continue the work of aiding the government authorities in the protection of the health of Ontario's people at all times.

### BRITISH COLUMBIA

THE report of the proceedings of the first annual convention of the hospitals of British Columbia has just been issued and contains a quantity of highly informative and useful matter. It is so comprehensive that it should be possible for the entire medical and nursing profession in this province to benefit almost as much from a perusal of the bulletin as if they had attended the sessions of the convention. Comprised in the report is the constitution and by-laws of the British Columbia Hospital Association, so that any of the smaller hospitals in the province which were unrepresented at the time, by getting the bulletin, can learn all the requirements of membership, etc. In the election of officers Hon. J. D. Maclean was made honorary president; Dr. M. T. MacEachern, president; 1st vice-president, R. S. Day; 2nd vice-president, Major Gray, of New Westminster; secretary, Mrs. Johnson, Vancouver, and treasurer, Dr. Gatewood, Vancouver.

THE Vancouver Medical Society are planning a state medical service; the president, Dr. J. W. Ford, explains the situation. Medical supervision in the schools and the Workman's Compensation Board have already established a partial state service. In England the idea has been more fully developed in the system by which everyone has an option of joining the state medical service by paying so much from his wages, receiving in return free medical treatment. While any such measures would have to be enacted by the provincial legislature, it would be necessary first to have the main body of medical men in co-operation.

THE Victoria Medical Association held its annual meeting early in November when the election of officers for the ensuing year took place. Dr. A. B. Hudson, the vice-president, was elected to succeed the retiring president, Dr. W. T. Barrett; Major E. H.

Ridewood was elected vice-president. Pressure of military duties necessitated the retirement of Dr. Thomas Miller from the office of secretary to the Association, which he had so long and ably filled, and Dr. E. W. Boak was elected secretary in his stead. It is now finally settled that two concentration hospitals will be established, one on the mainland and the other on Vancouver Island. The former will be somewhere between New Westminster and Vancouver. These two institutions will take all the patients now in the various military hospitals in the whole of British Columbia with the exception of those at special institutions, such as Balfour and Tranquille.

THE Provincial Board of Health has just issued, in a report which covers the first six months of the present year, some important vital statistics. The population of the province at the end of 1917 was 382,689, not including some 25,000 Indians. In the first six months of the present year deaths totalled 2,046, and births 4,940, while there were 1,443 marriages. Despite the attention paid to the prevention of tuberculosis, in the six months stated deaths from that disease totalled 236. For the whole of last year the total was 413. If the rate of the first six months of this year is maintained the total for the whole year will show a gain of 14.28 per cent. over 1917. Cancer is another disease which shows an increasing tendency. Last year the total deaths therefrom were 248. In the first six months of this year the total was 144. If this rate is maintained an increase of 16.66 per cent. over 1917 will be recorded. In the death rate from tuberculosis the Oriental population suffered most, the percentage of deaths amounting to 22.49.

#### ARMY MEDICAL SERVICES

THE Distinguished Service Order has been awarded to Major A. L. Lockwood, M.D., for gallantry under fire with the Royal Army Medical Corps. In 1916 Major Lockwood was decorated with the Military Cross for gallantry while acting at an advanced dressing station, and still later won the Mons Star for participating in the early fighting in 1914. His home is in Westport, Ontario, and he is a graduate of McGill University of the class of 1910.

Major Lockwood received a still further honour, being invited as a representative of the Royal Army Medical Corps to read a paper on "Chest Surgery" before the International Con-



gress of Surgeons at Paris. He and Sir John Rose Bradford were the only men to speak before the Chest Section of the Congress.

CAPTAIN DONALD C. MALCOLM, M.D., of St. John, New Brunswick, has been awarded the Military Cross. Captain Malcolm went overseas as medical officer of the 140th Battalion. Previous to his entering military service he had been holding the post of superintendent of the General Public Hospital of St. John.

CAPTAIN FINLAY MUNROE, C.A.M.C., of Glengarry, Ontario, has been awarded the Military Cross for gallantry at Amiens. He went overseas with the 154th Battalion. He graduated in Medicine from McGill University and has been stationed at No. 36 Canadian General Hospital, Boulogne.

THE Military Cross has been awarded to James Mossman, C.A.M.C.

THE Military Medal has been awarded to J. I. Ferguson and W. Menzies, both of the C.A.M.C.

NURSING SISTER THEODORA A. McKIEL of Fairville, New Brunswick, was decorated by the King on July 17th with the Royal Red Cross. Leaving Canada with the First Contingent she has seen service in Great Britain, France and Salonika, and on returning from eighteen months duty at the latter front was appointed Matron to No. 15 Canadian General Hospital.

DR. A. G. NICHOLLS, Professor of Pathology and Bacteriology in Dalhousie University, who has been for the past three years Fortress Sanitary Officer at Halifax, with charge of the District Laboratory of Hygiene, has been appointed D.A.D.M.S. (Sanitation), M.D. No. 6, with rank of major.

Six Medical Boards have been employed at the Exhibition Camp, an average of 120 men being examined every day. Major G. G. Mitchell, G.S.O., has been appointed to co-operate with the department of the A.A.G. at Headquarters to hasten the process of demobilization. It is the policy of the district authorities to utilize all able-bodied Category "A" draftees in the Army Medical Corps in the other branches of the Service where they may be required. University students in the Army Medical and Dental

Corps, anxious to resume their studies, will be discharged immediately.

DR. BOYD, representative of the Invalided Soldiers' Commission for Medicine Hat district, has received instructions from Ottawa to the effect that owing to the prevalence of influenza which is epidemic, the department will undertake the care and treatment of all ex-soldiers who are suffering from influenza. These men are taken on the strength only for care and treatment and not for pay and allowance except in those cases where the war disability is responsible for their condition. This would include asthmatic, bronchitis, and gas cases particularly.

THE King paid a special visit to the Canadian Hospital at Doullens, during his recent visit to France. It had been deliberately bombed by the Germans a few months before. The King listened to the story of the outrage, which was related by the commanding officer, and as he was leaving he paid a special tribute to the nursing sisters and doctors, saying: "By continuing your work of mercy after such a terrible experience you have set an example to the whole world."

*Appointments:*

CAPTAIN EDWARD LIVERSAY is appointed Adjutant at the Ogden Military Convalescent Hospital. Captain Robert John Kee is detailed for duty under the A.D.M.S., M.D. No. 2. Honorary Captain Lorne Campbell Johnstone is posted for duty in the District Paymaster's Office, M.D. No. 10. Captain William Arthur Harvie is posted for duty at the Regina Military Hospital. Major John William Hutchinson is posted for duty at the D.G.M.S. Office, Ottawa. Lieutenant-Colonel Lewis Wentworth Irving, D.S.O., is detailed as A.D.M.S., M.D. No. 2, with the rank of Colonel. Major Keith Forrester Rogers is posted for duty at the Military School of Orthopædic Surgery and Physiotherapy, Hart House, Toronto. Captain Seymour Traynor is posted for duty at the Ste. Anne de Belleville Military Hospital.

THE following officers have been selected to serve in the Overseas Military Forces of Canada: Captains A. J. Randall, L. D. Buck, C. D. Hamilton, M. J. Kennedy, E. L. Pennock, M. P. Smith, H. H. Cheney, E. A. Greenspon, A. B. Illievitz, J. H. F. Malone, D. Nathan, H. S. Tait, E. B. Peake, D. W. Morreson, W. L. Luton, H. C. Watson, J. A. Locke, J. A. McPhee. Lieuten-

ants S. J. W. Horne, R. H. Lalonde, F. B. Sharp, S. F. Tichborne, G. A. Cheeseman, R. Fontaine, A. H. Greenwood, A. M. Lightstone, W. McL. McLeod, C. E. H. Tuchy, J. E. Wadsworth, L. Robert, J. M. Donnelly, W. S. Quint, T. D. A. McGregor, J. E. Pritchard, D. A. McAulay, E. Wershof, W. E. Munro, H. J. Robillard, I. Y. Patrick.

MAJOR GEORGE MAY FOSTER is posted as officer in command, medicine Military Hospital, Quebec.

LIEUTENANT-COLONEL THOMAS ALBERT STARKEY appointed consultant in Sanitation for M.D. Nos. 4, 5, 6, and 7.

MAJOR MALCOLM M. CRAWFORD posted as Registrar St. Andrew's Military Hospital from the office of the D.G.M.S., Ottawa.

*Promotions:*

To be Lieutenant-Colonel: Captain Arthur Stirling Gorrell.

To be Temporary Majors, O.M.F.C.: Captains D. B. Kennedy, M.C., J. A. Briggs, H. Hart, M.C.

To be Acting Majors, O.M.F.C.: Captains H. M. Barrett, F. W. Lees, M.C., E. Douglas, M.C., L. C. Palmer.

Temporary Lieutenant-Colonel W. T. M. MacKinnon to be Acting Colonel while commanding a special hospital.

To be Captains: Lieutenants Austin F. Gillis, Eldon Douglas Coutts, John McDonald, Harvey Elgin Hicks, John Jennings Watts.

*Returned from Overseas (Officers):*

Lieutenant-Colonel G. Royce, Lieutenant-Colonel A. T. Bazin; Major G. H. Foster; Captains C. F. Magee, George R. Baby, Kenneth Lorne MacKinnon, R. H. Arthur, W. H. Cochran, D. M. Lineham, M. D. McEwen, T. R. Ponton, Alexander Robert Munroe, W. H. Taylor, R. V. McCarley, W. E. Guest, C. T. McCallum, R. Henderson, John Joseph Cawthra, C. B. Waite, A. D. Irvine, H. B. Logie; Acting Major J. E. Campbell, Daniel Wade Davis, W. Curtis.

CASUALTIES

*Died of Wounds:*

DR. HARRY DUNLOP, C.A.M.C., Kingston.

J. B. HANWAY, C.A.M.C., Truro, Nova Scotia.

*Died on Active Service:*

A. SAMUEL, C.A.M.C., St. John, New Brunswick.

H. PITMAN, C.A.M.C., England.

*Wounded:*

W. HADDEN, C.A.M.C., Winnipeg.  
J. BURKE, C.A.M.C., River Bourgeoise, Nova Scotia.  
A. WARNER, C.A.M.C., England.  
S. CAHILLE, C.A.M.C., Sydney, Nova Scotia.  
J. A. COOPER, C.A.M.C., Souris, Manitoba.  
W. R. COPP, C.A.M.C., Blythe, Ontario.  
J. H. DANIEL, C.A.M.C., Brantford, Ontario.  
J. CROWTHER, C.A.M.C., Calgary.  
C. R. DEBURGH, C.A.M.C., England.  
A. MILLEN, C.A.M.C., England.

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**Book Reviews**

**CLINICAL CASE-TAKING.** An Introduction to Elementary Clinical Medicine. By ROBERT D. KEITH, M.A., M.D., formerly principal of the King Edward VII. Medical School, Singapore. 96 pages. Price 3/6 net. Publishers: H. K. Lewis & Co., 136 Gower Street, London, W.C.

This small manual was written for the students of King Edward VII. Medical School, Singapore; on this account it contains reference to tropical diseases and their clinical laboratory findings, which do not appear in those manuals used by us.

It is a simple summary of methods generally recognized and covers only the ground it claims in its title, an introduction to elementary clinical medicine.

**LESSONS FROM THE ENEMY. HOW GERMANY CARES FOR HER WAR DISABLED.** By JOHN R. McDILL, M.D., F.A.C.S., major, medical reserve corps, U. S. Army. Price, \$1.50. Publishers: Lea & Febiger, Philadelphia and New York, 1918.

This is the fifth of a series of Medical War Manuals issued by Lea and Febiger under the supervision of the Surgeon-General, U.S.A.

The author made his observations while director of an Ameri-



can hospital unit in Germany in 1916. He was given every facility for his study of the sanitary (including medical and surgical) organizations of the German army. The little volume includes chapters on volunteer nursing and welfare work under the Red Cross, re-education and orthopædic hospitals and workshops, and hospital systems in peace.

It is a capital little manual and will well repay careful perusal by every army medical officer. It is well illustrated.

**LABORATORY METHODS OF THE UNITED STATES ARMY.** Compiled by the Division of Infectious Diseases and Laboratories office of the Surgeon-General, War Department, Washington. Price, \$1.50. Publishers: Lea & Febiger, Philadelphia and New York, 1918.

This volume, the sixth of the series of War Manuals issued by Lea & Febiger, requires no review. It is authorized by the Surgeon-General, U.S.A., and compiled by the division of Infectious Diseases and Laboratories. It contains both quantitative and qualitative analytical methods, covers collection and shipping of specimens, preparation of solutions and stains, analytical and bacteriological methods, with examination of milk, water supplies and sewage. A valuable manual both for the army man and the civilian laboratory worker.

**MEDICAL SERVICE AT THE FRONT.** By LIEUTENANT-COLONEL JOHN McCOMBE, C.A.M.C., and CAPTAIN A. F. MENZIES, M.C., C.A.M.C. Price, \$1.25. Publishers: Lea & Febiger, Philadelphia and New York, 1918.

This little manual written by Canadians, dedicated to the Canadian Premier, and with its foreword by the D.G.M.S., Canada, is one which should be read by all who wish to be conversant with the medical service and its arrangements for the care of the sick and wounded at the front.

A short but succinct account is given of the disposition of the army in the field, and thus the linking of the combatant and medical service is made more clear. The authors are to be congratulated upon the mass of information they have managed to compress into such small but very readable compass.

### Medical Societies

- CANADIAN MEDICAL ASSOCIATION:**—President—Dr. H. B. Small, Ottawa. President-elect—Dr. S. G. Grondin, Quebec. Acting Secretary-treasurer—Dr. J. W. Scane, 836 University Street, Montreal.
- ACADEMY OF MEDICINE, TORONTO:**—President—Dr. D. J. Gibb Wishart. Secretary—Dr. J. H. Elliot, 11 Spadina Road. Treasurer—Dr. J. H. McConnell.
- ALBERTA MEDICAL ASSOCIATION:**—President—Dr. G. A. Anderson, Calgary. Secretary-treasurer—Dr. A. Fisher, Calgary. Annual Meeting, Calgary, 1919.
- ASSOCIATION OF MEDICAL OFFICERS OF THE MILITIA:**—President—Lt.-Colonel A. T. Shillington, A.M.C., Ottawa. Secretary—Captain T. H. Leggett, A.M.C., Ottawa.
- ASSOCIATION OF MEDICAL OFFICERS OF NOVA SCOTIA:**—President—Dr. George E. DeWitt, Wolfville. Secretary—Dr. W. H. Hattie, Halifax.
- BRANT COUNTY MEDICAL SOCIETY:**—President—Dr. E. R. Secord, Brantford. Secretary—Dr. M. N. Faris.
- BRITISH COLUMBIA MEDICAL ASSOCIATION:**—President—Dr. I. Glen Campbell, Vancouver. Secretary—Dr. H. W. Riggs, Vancouver.
- CALGARY MEDICAL ASSOCIATION:**—President—Dr. H. A. Gibson. Secretary—Dr. J. W. Richardson. Treasurer—Dr. J. V. Follett.
- CANADIAN ASSOCIATION FOR THE PREVENTION OF TUBERCULOSIS:**—President—Dr. J. A. Machado, Ottawa. Secretary—Dr. George D. Porter, Ottawa.
- CANADIAN HOSPITAL ASSOCIATION:**—President—Dr. H. A. Boyce, Belleville. Secretary—Dr. J. M. E. Brown, Toronto.
- CANADIAN PUBLIC HEALTH ASSOCIATION:**—President—Dr. J. W. Hattie, Halifax, Nova Scotia. Secretary—Dr. J. G. Fitzgerald, University of Toronto.
- CENTRAL SOUTHERN ALBERTA MEDICAL SOCIETY:**—President—Dr. J. S. Murray, Okotoks. Secretary-treasurer—Dr. G. E. Learmonth, High River.
- COLCHESTER-HANTS MEDICAL SOCIETY:**—President—Dr. J. W. T. Patton, Truro. Secretary—Dr. H. V. Kent, Truro.
- DUFFERIN MEDICAL SOCIETY:**—President—Dr. Rooney, Orangeville. Secretary—Dr. Smith, Shelburne.
- EDMONTON ACADEMY OF MEDICINE:**—President—Dr. J. A. McPherson. Secretary-treasurer—Dr. T. H. Prust. Library, Civic Block.
- ELGIN COUNTY MEDICAL ASSOCIATION:**—President—Dr. F. F. McEwen, Aylmer. Secretary-treasurer—Dr. W. F. Cornett, St. Thomas.
- FRASER VALLEY MEDICAL SOCIETY:**—President—Dr. DeWolfe Smith. Secretary—Dr. D. F. Carswell.
- GUELPH MEDICAL ASSOCIATION:**—President—A. T. Hobbs. Secretary—J. Lindsay.
- HALDIMAND COUNTY MEDICAL ASSOCIATION:**—President—Dr. Hopkins, Dunnville. Secretary—Dr. Courley, Cayuga, Ont.
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